

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.



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



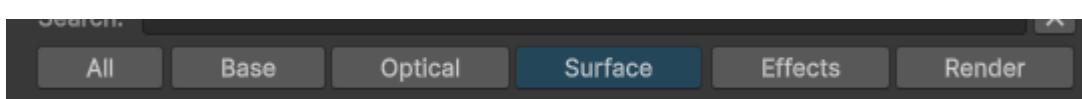
Tip: Presets are saved in Assets/SingularBear/GlassShader/Presets



Editor Interface

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

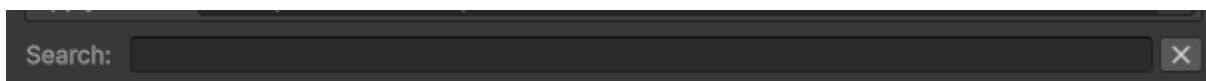
Category Tabs



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

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

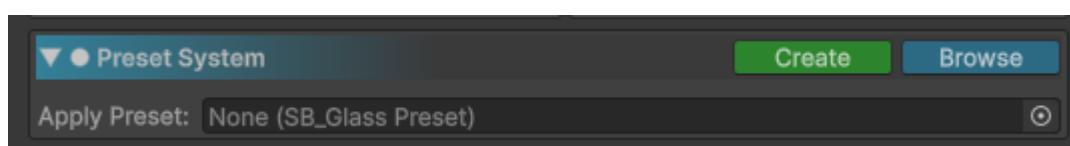
Performance Indicator

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!

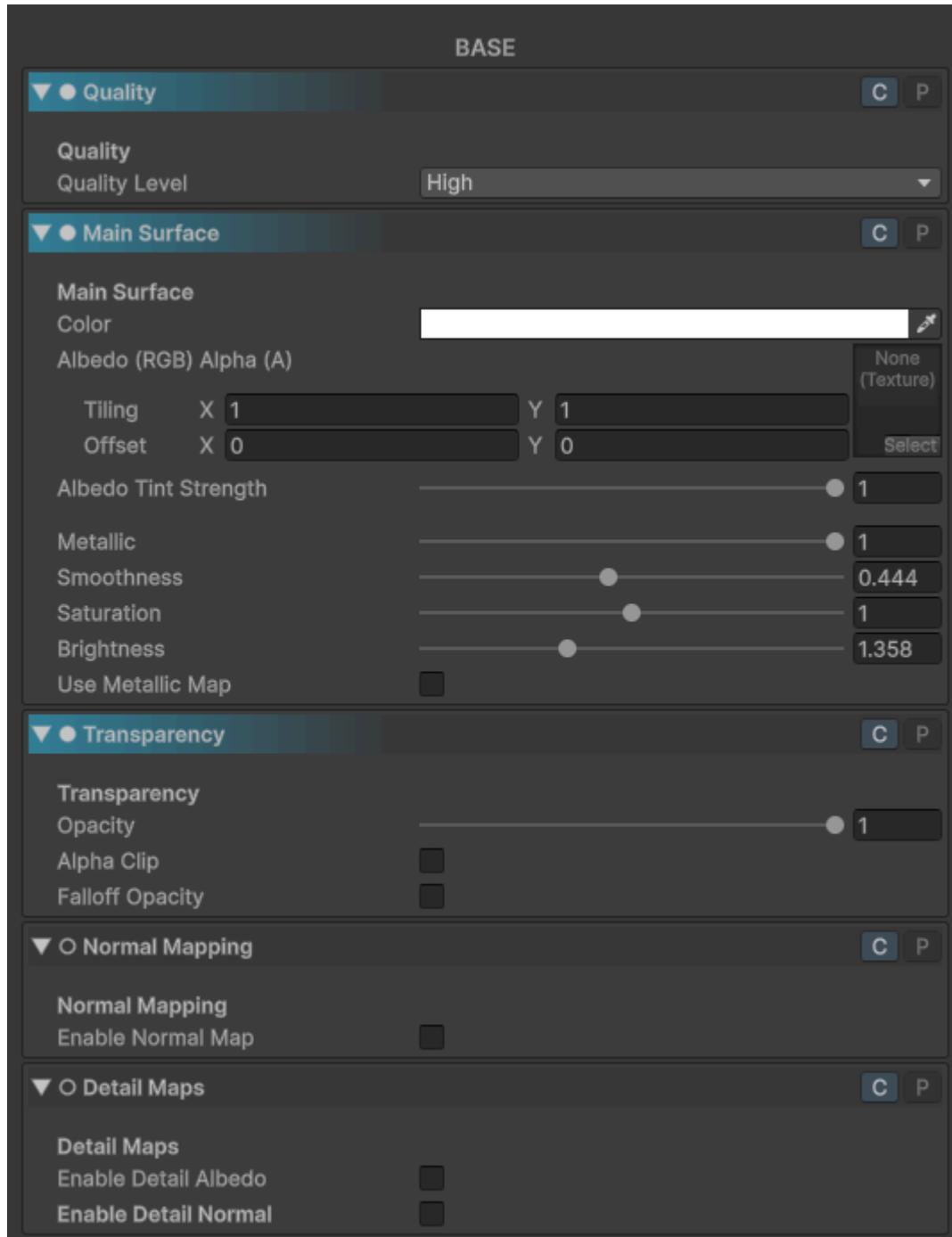
1. Click **Create** in the Preset section
2. Give it a name, category, and description
3. To apply it later, select it and click **Apply Preset**

Copy/Paste

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

BASE

Everything related to the fundamental surface properties.



Quality

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



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

Main Surface

Parameter	Description
Color	Base color + initial alpha
Albedo	Base texture (RGB = color, A = transparency)
Albedo Tint Strength	How much the texture influences the color
Metallic	0 = dielectric (glass), 1 = polished metal
Smoothness	Higher = shinier
Saturation	Adjusts overall saturation
Brightness	Brightens or darkens
Metallic Map	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
Normal Map	The normal map texture
Normal Scale	Strength (1 = normal, >1 = exaggerated)

Detail Maps

Repeating micro-details that overlay the base surface.

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

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

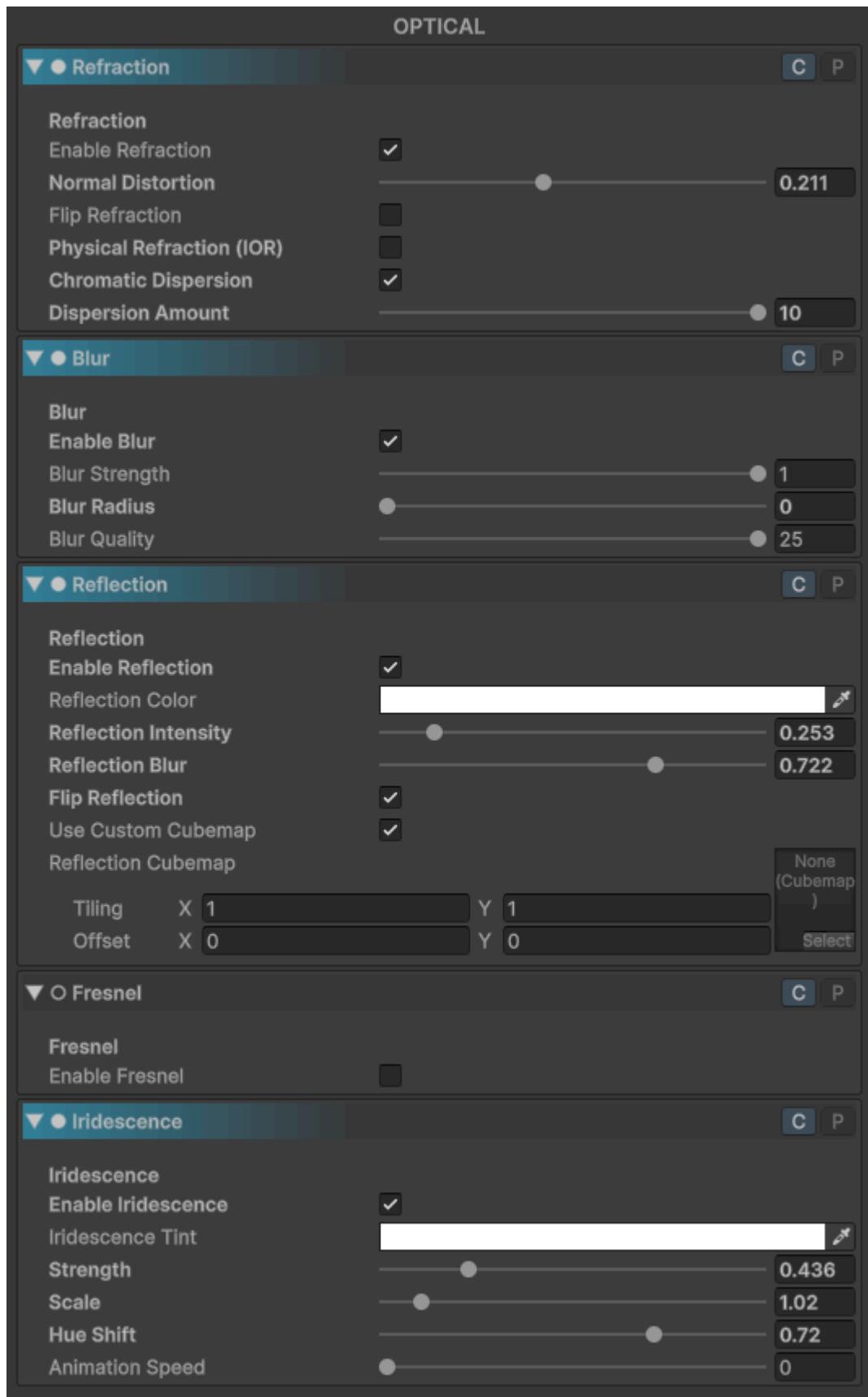
Transparency

Parameter	Description
Opacity	Global transparency (0 = invisible, 1 = opaque)
Alpha Clip	Hard cuts pixels below threshold
Alpha Clip Threshold	The cutoff value
Falloff Opacity	Transparency varies by view angle
Falloff Intensity	Strength of the falloff
Falloff Power	Controls the curve
Invert Falloff	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
Normal Distortion	Distortion amount (0.05-0.15 for realism)
Flip Refraction	Inverts direction
Physical (IOR)	Physics-based refraction
IOR Strength	Index of refraction intensity
Origin Medium	Air/Water/Glass - where light comes from
Chromatic Dispersion	Separates RGB like a prism 
Dispersion Amount	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
Blur Strength	Intensity
Blur Radius	Size of blur kernel
Blur Quality	Sample count (4-25)



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

Reflection

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

Fresnel

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

Parameter	Description
Fresnel Color	Tint color
Fresnel Power	Curve control (3-5 for realism)
Fresnel Intensity	Effect strength
Fresnel Min	Minimum at center
Fresnel Max	Maximum at edges
Invert Fresnel	Flips the effect
Affect Alpha	Fresnel affects transparency
Affect Reflection	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
Iridescence Tint	Base tint color
Strength	Effect intensity
Scale	Size of color bands
Hue Shift	Shifts the colors
Animation Speed	Animates colors (0 = static)



SURFACE

Surface details and lighting effects.

SURFACE

▼ ● Surface Noise C P

Surface Noise
Enable Surface Noise
Noise Scale 500
Noise Strength 3.7
Normal Distortion 10
Animation Speed 0

► ○ Tint Texture C P

► ○ Edge Darkening C P

► ○ Inner Glow C P

► ○ Thickness C P

► ○ Depth Fade C P

► ○ Rain C P

▼ ● Rim Lighting C P

Rim Lighting
Enable Rim
Rim Color
Rim Power 10
Rim Intensity 1.241
Rim Min 0.021
Rim Max 0.956

▼ ● Specular C P

Specular
Enable Specular
Specular Color
Specular Intensity 8.85

Shape
Highlight Size 0.475
Smoothness 0.499
Edge Hardness 0.684

Stylized
Toon Mode
Toon Steps 6.63
Toon Threshold 0.791

Specular Options
Fresnel Specular
Anisotropy 0.717
Diffuse Intensity 0

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Surface Noise

Procedural noise for imperfections or stylized effects.

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

Tint Texture

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

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

Edge Darkening

Darkens edges, simulating light absorption at grazing angles.

Parameter	Description
Strength	How dark edges get
Power	Falloff curve
Distance	How far darkening extends

Inner Glow

Glowing effect from inside. Great for magical objects.

Parameter	Description
Glow Color	Glow color
Strength	Intensity
Power	Concentration
Falloff	Edge fade speed

Thickness

Varying glass thickness using a texture.

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



Great for bottles, vases, or varying wall thickness.

Depth Fade

Fades glass based on distance to objects behind it.

Parameter	Description
Fade Distance	How far the fade extends
Fade Color	Color at intersection

Rain

Rain droplets flowing down the surface.

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

Rim Lighting

Glowing outline on edges. Perfect for magical effects.

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

Specular

Bright highlights on glass.

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

★ EFFECTS

Advanced effects and overlays.

EFFECTS		
▶ O Translucency	C	P
▶ O Occlusion	C	P
▶ O Emission	C	P
▶ O Triplanar	C	P
▶ O Absorption	C	P
▶ O Caustics	C	P
▶ O Total Internal Reflection	C	P
▶ O Sparkle	C	P
▶ O Dirt/Moss	C	P
▶ O Decals	C	P
▶ O Fingerprints	C	P
▶ O Distortion FX	C	P

Translucency

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

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

Occlusion

Darkens recessed areas.

Parameter	Description
Occlusion Map	Grayscale texture
Occlusion Strength	Darkening intensity

Emission

Glass that glows from within.

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

Triplanar

Projects textures on all 3 axes. No UVs needed.

Parameter	Description
Triplanar Scale	Projection size
Blend Sharpness	Axis transition sharpness

Absorption

Light absorbed traveling through glass.

Parameter	Description
Absorption Color	Color of absorbed light
Density	Absorption speed
Falloff	Curve control



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

Caustics

Light patterns projected by glass.

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

Total Internal Reflection (TIR)

Light bouncing inside glass at steep angles.

Parameter	Description
TIR Intensity	Effect strength
Critical Angle	When TIR kicks in
Edge Sharpness	Transition sharpness

Sparkle

Glittering particles! Perfect for crystals.

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

Dirt & Moss

Weathering effects that accumulate on surfaces.

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

Parameter	Description
Roughness	Surface roughness
Normal Blend	Blends with base normal
Edge Noise	Noisy edges
Fresnel Falloff	View-angle based falloff
Triplanar	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
Texture	RGBA decal image
Position XY	Center point (0-1 UV)
Size	Scale
Rotation	Angle in degrees
Intensity	Opacity
Tint	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
Texture	Fingerprint pattern (R channel)
Position	Placement
Scale/Radius	Size
Rotation	Angle
Intensity	Visibility
Roughness Add	Makes area more matte

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

Barrel

Parameter	Description
Strength	+ = barrel, - = pincushion

Waves

Parameter	Description
Amplitude	Wave height
Frequency	Wave count
Speed	Animation
Radial	Circular waves

Ripple

Parameter	Description
Center XY	Ripple origin
Amplitude	Strength
Frequency	Density
Speed	Animation

Parameter	Description
Decay	Fade outward

Swirl

Parameter	Description
Center XY	Swirl center
Strength	Rotation amount
Radius	Area size
Speed	Animation

Heat Haze

Parameter	Description
Strength	Distortion
Speed	Shimmer speed
Scale	Pattern size

Pixelate

Parameter	Description
Pixel Size	Block size

RENDER

Rendering settings and shadow options.

Shadows

Parameter	Description
Receive Shadows	Glass receives shadows
Shadow Intensity	How dark shadows appear

Rendering

Parameter	Description
Surface Type	Transparent or Opaque

Parameter	Description
Blend Mode	Alpha / Premultiply / Additive / Multiply
Culling	Back / Front / Off (double-sided)
Z Write	Write to depth buffer
Z Test	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!

Last updated: January 2026

Version: 1.0