Almost Everything

Almost Everything means everything that cannot carry an electrical current (except a few special materials outlined below), including non-colored glass, and water! Almost Everything materials should use the basic **Lit** material or one of it's variants

- Lit
- Lit Detail

Shader Slot	Texture Size	What to put in this slot
Diffuse Color	1024 (8 ppi)	a texture with the color of the material without **any** lighting information
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Detail Normal (optional)	256 (16 ppi or more)	tiled geometry details larger than 1/8" and smaller (scratches)
Occlusion	512 (0-255 grayscale)	leave this blank unless your surface has deep crevices, or occluding surface geometry, or is very glossy and you need to block part of the reflection probe. Values in this texture only affect two things, the amount of ambient light that will light the surface and the amount of reflection probe that will visible on the surface.
Gloss Map	1024 (0-255 grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Gloss Range	n/a	set using the presets in the Gloss Range drop-down menu at the top
Albedo Tint	n/a	Controlled by the alpha channel of the Color Map. Applies a color tint to the diffuse map by multiplying the selected color onto the Color Map in the places where the alpha of the Color Map is non-zero.

Grim, Dust, Dirt

For accumulated dust, dirt, and grime use the decal shaders as much as possible. These should be authored on coplanar geometry, the engine will sort out the rendering. If you need to control the layering order of multiple decals, there is a Decal Layer Manager in Radiant that lets you specify how the decals stack up.

Deferred decals (all shaders with lit_decal in the name) will only layer properly over other deferred surfaces. So, do not try to stack decals on top of transparent shaders or use decal shaders as free-standing transparent surfaces like a glass window.

- Lit Decal
- Lit Decal Advanced
- Lit Decal Diffuse
- Lit Decal Diffuse Normal
- Lit Decal Normal
- Lit Decal Reveal
- Lit Decal Reveal Advanced
- Lit Detail Decal
- Lit Detail Decal Advanced

Shader Slot	**Texture Size**	**What to put in this slot**
Diffuse Color	1024 (8ppi)	These materials behave just like the standard lit materials. So, this is a texture with the color of the material without any lighting information. You will also need an alpha channel for the decal to properly blend.
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Occlusion	512 (0-255 grayscale)	leave this blank unless your surface has deep crevices, or occluding surface geometry, or is very glossy and you need to block part of the reflection probe. *Values in this texture only affect two things*, the amount of ambient light that will light the surface and the amount of reflection probe that will visible on the surface
Gloss Map	1024 (0-255 grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range

Shader Slot	Texture Size	What to put in this slot
		regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Gloss Range	n/a	set using the presets in the **Gloss Range** drop-down menu at the top

Optional Shader Slots	Texture Size	What to put in this slot
Detail Normal (optional)	256 (16 ppi or more)	tiled geometry details larger than 1/8" and smaller (scratches)
Specular Map	n/a	Use this slot to define your metal and non metal areas. This slot will be used as a reveal texture to define which areas will be lit shaded as non metals, and which will be metal. The non-metal areas should be fully black, the metal areas should be white. The shader uses this map as a metalness mask. White will fully use the metallic color in the **Specular Tint** color picker, black will use specular simple.
Reveal Map	1024 (8 ppi, grayscale)	This acts as an additional control to modulate the blending of the decal with the underlying surface. Behaves like a height map where white parts are the highest.
Tint Mask	1024 (8 ppi, grayscale)	Masks where the **Albedo Tint** gets applied to the **Color Map**. Non-zero values in the **Tint Mask** will apply the selected tint to the **Color Map**.
Albedo Tint	n/a	Controlled by the **Tint Mask**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map** in the places where the alpha of the **Color Map** is non-zero.

Micro Tiled

These shaders are meant to add variety to surfaces and give flexibility to artists to hit the higher pixel densities that we are shooting for. I've only outlined the differences in the behaviors on the various maps used by these textures because the maps still need to adhere to all the usual physically based rendering rules.

- Lit Micro Tiled Macro Color
- Lit Micro Tiled Macro Color Advanced

Special Slots	**Texture Size**	**What to put in this slot**
Detail Color Map	256 (16 ppi or higher)	This is just like the diffuse texture in a standard lit shader, except it is meant to be tiled to create more detail and texture density.
Detail Normal Map	256 (16 ppi or higher)	A tiling normal map to add surface detail.
Detail Gloss Map	256 (16 ppi or higher, grayscale)	A tiling gloss map for even more detail.
Detail Specular Map	256 (16 ppi, or higher, grayscale)	This map is a tiling version of the specular mask map found in the standard Lit Advanced shader. The shader uses this map as a metalness mask. White will fully use the metallic color in the **Specular Tint** color picker, black will use specular simple.
Base Gloss	n/a	A spinner to give a gloss for the areas where there is no detail map.
Base Specular Reflectance	n/a	A spinner to give a specular reflectance where there is no detail map. **sRGB values!**
Albedo Tint	n/a	Controlled by the alpha channel of the associated **Detail Color Map**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Detail Color Map** in the places where the alpha of the **Detail Color Map** is non-zero.

- Lit Micro Tiled
- Lit Micro Tiled Advanced

These shaders have very few base maps and are driven primarily by the small tiling maps. Only the Normal and AO map remain of the core set of maps from Lit.

Special Slots	Texture Size	What to put in this slot
Albedo Tint	n/a	Controlled by the alpha channel of the associated Color Map. Applies a color tint to the diffuse map by multiplying the selected color onto the Color Map in the places where the alpha of the Color Map is non-zero.
Detail Color Map	256 (16 ppi or higher)	This is just like the diffuse texture in a standard lit shader, except it is meant to be tiled to create more detail and texture density.
Detail Gloss Map	256 (16 ppi or higher, grayscale)	A tiling gloss map for even more detail.
Detail Normal Map	256 (16 ppi or higher)	A tiling normal map to add surface detail.
Detail Specular Map	256 (16 ppi, or higher, grayscale)	This map is a tiling version of the specular mask map found in the standard Lit Advanced shader. The shader uses this map as a metalness mask. White will fully use the metallic color in the Specular Tint color picker, black will use specular simple.

- Lit Micro Tile Blend
- Lit MIcro Tile Blend Advanced

The idea is that the entire surface can be defined by blending two sets of small tiling maps. There is still a base normal map and AO map to provide some macro structure to the material.

Special Slots	Texture Size	What to put in this slot
Mix Map	1024 (8 ppi, grayscale)	Controls which of the two sets of tiling maps is used on this part of the surface.
Detail Maps1	256 (16 ppi or higher)	This is just like the diffuse texture in a standard lit shader, except it is meant to be tiled to create more detail and texture

Special Slots	Texture Size	What to put in this slot
Color Map		density.
Detail Maps1 Normal Map	256 (16 ppi or higher)	A tiling normal map to add surface detail.
Detail Maps1 Gloss Map	256 (16 ppi or higher, grayscale)	A tiling gloss map for even more detail.
Detail Maps1 Specular Map	256 (16 ppi, or higher, grayscale)	This map is a tiling version of the specular mask map found in the standard Lit Advanced shader. The shader uses this map as a metalness mask. White will fully use the metallic color in the **Specular Tint** color picker, black will use specular simple.
Detail Maps2 Color Map	256 (16 ppi or higher)	This is just like the diffuse texture in a standard lit shader, except it is meant to be tiled to create more detail and texture density.
Detail Maps2 Normal Map	256 (16 ppi or higher)	A tiling normal map to add surface detail.
Detail Maps2 Gloss Map	256 (16 ppi or higher, grayscale)	A tiling gloss map for even more detail.
Detail Maps2 Specular Map	256 (16 ppi, or higher, grayscale)	This map is a tiling version of the specular mask map found in the standard Lit Advanced shader. The shader uses this map as a metalness mask. White will fully use the metallic color in the **Specular Tint** color picker, black will use specular simple.
Albedo Tint	n/a	One for each **Color Map**. Controlled by the alpha channel of the associated **Color Map**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map** in the places where the alpha of the **Color Map** is non-zero.

Vegetation

For all foliage and vegetation this is the place to go. This shader models the translucency and slight sub-surface scattering that happens in leaves.

This shader takes into account what is a back sided and what is a front face; the back faces are made less glossy to accurately model the undersides of leaves. This means that you need to pay attention to which side of your mesh is front facing when modeling so that you get consistent results.

Shader Slot	**Texture Size**	**What to put in this slot**
Diffuse Color	1024 (8ppi)	this is a texture with the color of the material *without any lighting information*. You will also need an alpha channel for the alpha test to properly work on leaf edges.
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Occlusion	512 (0-255 grayscale)	leave this blank unless your surface has deep crevices, or occluding surface geometry, or is very glossy and you need to block part of the reflection probe. Values in this texture only affect two things, the amount of ambient light that will light the surface and the amount of reflection probe that will visible on the surface
Thickness Map	1024 (8 ppi, grayscale)	this map represents how much light bleeds through the leaf. The map represents the **thickness** of the surface so white means that no light will pass through the leaf.
Gloss Map	1024 (0-255 grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Gloss Range	n/a	set using the presets in the **Gloss Range** drop-down menu at the top
Back Scatter	n/a	this is an sRGB color that will change the tint of the light that passes through the leaf. This can be used to give leaves a reddish or

Shader Slot	Texture Size	What to put in this slot
Tint		yellowish cast on their back sides.

Clear Glass

For Clear Glass use the **Glass** material. For the shard material on glass objects, use **Glass Shard** (this material is the same as glass, it just allows the shard code to use it properly). Clean glass has a very dark diffuse color, but it is very transparent, as glass becomes dirty, the dirt diffuses the light. Clear glass uses the default spec color value.

Shader Slot	Texture Size	What to put in this slot
Diffuse Color	1024 (8 ppi)	For clean glass, you can use gloss black (40,40,40). Add dirt color for dirty glass; paint the dirt and grime as if it is fully opaque. The "Backscatter Tint" color swatch allows the light that passes through the glass to be tinted, simulating internal scattering. Export with an alpha channel for to store the transparency
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Occlusion	512 (grayscale)	leave this blank unless you really need it. Since glass usually has a very dark diffuse color, and is very transparent, this value will not affect lighting very much and so you will not need to put a value in this slot 99.9% of the time, however it is used to reduce the brightness of the reflection – so it is useful for masking or reducing slots and cavities to fake reflectance occlusion
Gloss Map	1024 (grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface. Even dirty glass is still very smooth.
Gloss Range	n/a	set to **"Glass"** using the presets in the **Gloss Range** drop-down menu at the top.

Mirrored Glass

Colored Glass is actually glass that has been tinted with metals, the salts of metals while it is molten, or treated with thin foil-like coatings of metal on one side (like a mirror). In order to achieve the affect of tinted glass you must use **Lit Advanced** and put the glass tint color into the spec color slot.

Note that opaque glass is really a mirror.

Shader Slot	**Texture Size**	**What to put in this slot**
Diffuse Color	1024 (8 ppi)	For clean glass, you can use gloss black (40,40,40). Add dirt color for dirty glass; paint the dirt and grime as if it is fully opaque. Export with an alpha channel for to store the transparency
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Occlusion	512 (grayscale)	leave this blank unless you really need it. Since glass usually has a very dark diffuse color, and is very transparent, this value will not affect lighting very much and so you will not need to put a value in this slot 99.9% of the time, however it is used to reduce the brightness of the reflection – so it is useful for masking or reducing slots and cavities to fake reflectance occlusion
Specular Map	n/a	For clean, and lightly soiled glass, leave this blank (it will default to $white at link time). For dirty glass, use as reveal to separate the diffuse color of the dirt from the glass (see below for more info). The shader uses this map as a metalness mask. White will fully use the metallic color in the **Specular Tint** color picker, black will use specular simple.
Spec Color	n/a	The tint of the glass as a saturated color.
Gloss Map	1024 (grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface. For clean glass this would be white (255,255,255)

Shader Slot	Texture Size	What to put in this slot
Gloss Range	n/a	set to **"Glass"** using the presets in the **Gloss Range** drop-down menu at the top

Transparency

Beyond the Glass and Foliage, transparency should be a rare occurrence. Make sure that you absolutely have to see through the surface before you use a transparent shader and then try to get away with alpha test whenever possible.

Alpha test is significantly cheaper than full transparency because we can still send alpha test materials though the deferred rendering pipeline. This means that we get minimal overdraw, and the overdraw we do get is not going through all the lighting calculations.

- Lit Alphatest
- Lit Alphatest Advanced
- Lit Alphatest Nocull
- Lit Alphatest Nocull Advanced
- Lit Detail Alphatest
- Lit Detail Alphatest Advanced

No cull shaders are very dangerous. No matter what, you have doubled the cost of this surface because both the front and back faces always render. With the transparent no cull shaders, you instantly have two layers of overdraw and two layers written into the OIT buffer, absolutely terrible.

Shader Slot	Texture Size	What to put in this slot
Diffuse Color	1024 (8ppi, with alpha)	this is a texture with the color of the material *without any lighting information*. You will also need an alpha channel for the alpha test to properly work.
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Occlusion	512 (grayscale)	leave this blank unless you really need it. Values in this texture only affect two things, the amount of ambient light that will light the surface and the amount of reflection probe that will

Shader Slot	Texture Size	What to put in this slot
		visible on the surface
Gloss Map	1024 (grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface.
Tint Mask	1024 (grayscale)	Mask that controls where the **Albedo Tint** gets applied to the **Diffuse Color**. Non-zero areas will get tinted.
Specular Map (Advanced only)	1024 (grayscale)	Use this slot to define your metal and non metal areas. This slot will be used as a reveal texture to define which areas will be lit shaded as non metals, and which will be metal. The non-metal areas should be fully black, the Metal areas should be white. The shader uses this map as a metalness mask. White will fully use the metallic color in the **Specular Tint** color picker, black will use specular simple.
Spec Color	n/a	The value for the metal that you are trying to represent from the Photoshop Palette of specular colors.
Albedo Tint	n/a	Controlled by the **Tint Mask**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map** in the places where the alpha of the **Color Map** is non-zero.

- Lit Transparent
- Lit Transparent Advanced
- Lit Detail Transparent
- Lit Detail Transparent Advanced

If you are using these you should be creating a grime decal to go on freestanding transparency like glass or something similar. In general, there is very little need for any shader with the word "transparent" in the name. Creating props that have transparency is recipe for overdraw, and overdraw is the number one killer of performance because you pay full price for each layer of overdraw: two layers of overdraw doubles the cost for that pixel and so on.

Shader Slot	Texture Size	What to put in this slot
Diffuse Color	1024 (8ppi, with alpha)	this is a texture with the color of the material *without any lighting information*. You will also need an alpha channel for the alpha test to properly work.
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Occlusion	512 (grayscale)	leave this blank unless you really need it. Values in this texture only affect two things, the amount of ambient light that will light the surface and the amount of reflection probe that will visible on the surface
Gloss Map	1024 (grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface.
Tint Mask	1024 (grayscale)	Mask that controls where the **Albedo Tint** gets applied to the **Diffuse Color**. Non-zero areas will get tinted.
Specular Map (Advanced only)	1024 (grayscale)	Use this slot to define your metal and non metal areas. This slot will be used as a reveal texture to define which areas will be lit shaded as non metals, and which will be metal. The non-metal areas should be fully black, the Metal areas should be white. The shader uses this map as a metalness mask.
Spec Color	n/a	The value for the metal that you are trying to represent from the Photoshop Palette of specular colors.
Albedo Tint	n/a	Controlled by the **Tint Mask**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map** in the places where the alpha of the **Color Map** is non-zero.

Base Metals

All Metals must use some variation of **Lit Advanced**

- Lit Advanced

- Lit Detail Advanced

Elemental Metals (Things found on the Periodic chart like Gold, Iron, Copper, Tin, etc)
Metals Alloys (Things chart like Brass, Bronze, Steel, etc)

Shader Slot	**Texture Size**	**What to put in this slot**
Diffuse Color	1024 (8 ppi)	true black (0,0,0)
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Detail Normal (optional)	256 (16 ppi)	tiled geometry details larger than 1/8" and smaller (scratches)
Occlusion	512 (grayscale)	leave this blank unless you really need it. Since the diffuse color is black for a pure metal, this value will not affect lighting, however it is used to reduce the brightness of the reflection – so it is useful for masking or reducing slots and cavities to fake reflectance occlusion
Specular Map	n/a	leave this blank (it will default to $white at link time)
Spec Color	n/a	the metal's specular color taken from the values in the Color Reference panel in Photoshop. All metals except gold, copper, and alloys that include copper (like brass and bronze) have a grayish specular color and all of these values are above 187 in brightness. The color of the specular color is the apparent color of a metal to the human eye. For alloys, you can get this info from a photograph bu selecting the brightest, saturated color on the metal's surface.
Gloss Map	1024 (grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Gloss Range	n/a	set using the presets in the **Gloss Range** drop-down menu at the top

Shader Slot	Texture Size	What to put in this slot
Albedo Tint	n/a	Controlled by the alpha channel of the **Color Map**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map** in the places where the alpha of the **Color Map** is non-zero.

Partially Oxidized Metals (Rust, etc) or Mixed Metal & Non-Metal

All Metals and mixed materials must use some variation of **Lit Advanced**

- Lit Advanced
- Lit Detail Advanced

Elemental Metals (Things found on the Periodic chart like Iron, Copper, Tin, etc – except Gold, which does not oxidize, and Lead)
Metals Alloys (Things chart like Brass, Bronze, Steel, etc)

Shader Slot	Texture Size	What to put in this slot
Diffuse Color	1024 (8 ppi)	paint the maximum, lit color of the oxidized metal. If the material will have a mixture of oxidized and base metals, or metal and non-metal materials on the same texture, then make sure teh areas that will have bare metal are true black (0,0,0)
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Detail Normal (optional)	256 (16 ppi)	tiled geometry details larger than 1/8" and smaller (scratches)
Occlusion	512 (grayscale)	leave blank unless you need to represent diffuse-occluded cavities
Specular Map	1024 (grayscale)	Use this slot to define your metal and non metal areas. This slot will be used as a reveal texture to define which areas will be lit shaded as non metals, and which will be metal. The non-metal

Shader Slot	Texture Size	What to put in this slot
		areas should be fully black, the Metal areas should be white. The shader uses this map as a metalness mask. White will fully use the metallic color in the **Specular Tint** color picker, black will use specular simple.
Spec Color	n/a	the metal's specular color taken from the values in the Color Reference panel in Photoshop. All metals except gold, copper, and alloys that include copper (like brass and bronze) have a grayish specular color and all of these values are above 187 in brightness. The color of the specular color is the apparent color of a metal to the human eye. For alloys, you can get this info from a photograph bu selecting the brightest, saturated color on the metal's surface.
Gloss Map	1024 (grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Gloss Range	n/a	set using the presets in the **Gloss Range** drop-down menu at the top
Albedo Tint	n/a	Controlled by the alpha channel of the **Color Map**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map** in the places where the alpha of the **Color Map** is non-zero.

Multiple Types of Metals

Use these shaders only if you definitely need to have two types of metal on one material (for example: brass AND silver). Consider splitting this material into two separate materials.

- Lit Advanced Fullspec
- Lit Detail Advanced Fullspec

Shader Slot	Texture Size	What to put in this slot
Diffuse Color	1024 (8 ppi)	all areas that have either of the bare metals on them must be true black (0, 0, 0). All other areas should have the maximum, lit color of the oxidation, paint, or grime that covers the metal.
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Detail Normal (optional)	256 (16 ppi)	tiled geometry details larger than 1/8" and smaller (scratches)
Specular Map	1024 (8 ppi)	paint the specular color for the appropriate metal alloy that you find in the Photoshop Color Reference Panel on all the bare metal areas. All other areas should be painted to match specular simple (56, 56, 56).
Gloss Map	1024 (grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Gloss Range	n/a	set using the presets in the **Gloss Range** drop-down menu at the top
Albedo Tint	n/a	Controlled by the alpha channel of the **Color Map**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map** in the places where the alpha of the **Color Map** is non-zero.

Special Cases

These shaders are mostly designed for one special purpose and need to be used carefully and intelligently, otherwise unexpected results and/or bad performance will result. With that being said, here's some information that should make it possible to use these shaders for their purpose and in an intelligent manner. These shaders still obey the physically based rendering rules, so most of the maps are identical to the core lit shaders.

- Lit Backlit
- Lit Backlit Advanced
- Lit Transparent Backlit
- Lit Transparent Backlit Reveal
- Lit Transparent Backlit Advanced

These shaders have also been referred to as the "lampshade shaders". The idea is to accurately model the covers of lights, lamps, and light fixtures. With that being said, these shaders receive lighting from both their front and their back sides, but do not cast shadows from back faces. These materials are meant to be used with a light placed behind them to provide the actual glow and illumination. Hopefully, this makes switching lights on and off easier because we don't have to dial in and sync up a bunch of emissive materials.

Only use the transparent version of these shaders if you absolutely have to create a torn and tattered lampshade, or need to be able to see through this surface. Most of the time these surfaces should be opaque, they will naturally let the light shine through. If you do use the transparent version (and you double checked that you really, really need it) don't forget to add alpha to your diffuse texture.

Special Slot	**Texture Size**	**What to put in this slot**
Backlight Mask Map	1024 (8 ppi, grayscale)	This map is used to represent any bars, wire, or internal structure that can occlude the light that comes through.
Reveal Map	1024 (8 ppi, grayscale)	This map is used in conjunction with the vertex alpha value to reveal or fade the mesh.
Albedo Tint	n/a	Controlled by the alpha channel of the **Color Map** or the **Tint Mask** if the alpha is needed for transparency. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map** in the places where the alpha of the **Color Map** is non-zero.

- Lit Emissive
- Lit Emissive Transparent
- Lit Emissive Transparent Advanced
- Lit Emissive Scroll Transparent
- Lit Emissive Scroll Transparent Advanced

These shaders are also lit, they will behave properly in multiple lighting environments. These can be used for computer screens, glowy tech read-outs, etc.
Once again, BE VERY CAREFUL WHEN USING THE TRANSPARENT VERSIONS. Make sure you really need to be able to see the scene through this material before using any of the transparent shaders.

Special Slot	**Texture Size**	**What to put in this slot**
Emissive Map	1024 (8 ppi)	This is a full color map that represents the glowy parts of the surface. Make the brightest parts as bright as the selected color will allow and parts that have no glow should be full-on black (0, 0, 0).
Depth	n/a	This is a depth value for the parallax effect on the emissive map, if you want the glow to appear to come from underneath the lit surface. Start with the default (0.1). If you try a crazy number, you'll probably poke your eye out.
HDR Scale	n/a	This corresponds to the HDR brightness of the brightest part of your emissive map. Talk to the lighters to find out what type of light your glowy bits are supposed to match in intensity and they can give you a good value. If you know the exposure for the area that you want your glowy bits to glow correctly, you can easily figure out the HDR scale as follows: **1.** Get the exposure value for the area you are placing this prop (An interior at EV 3, for example) **2.** Evaluate 2 ^ EV (type that into google and it will give you numbers) and you have your HDR scale value. For example, the interior with EV 3 would mean that we need to raise two to the third power, which gives us 8. Eight is our HDR scale.
Albedo Tint	n/a	Controlled by the alpha channel of the **Color Map** or the **Tint Mask** if the alpha is needed for transparency. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map** in the places where the alpha of the **Color Map** is non-zero.
Emissive Tint	n/a	Just like the **Albedo Tint** but applied to the entirety of the **Emissive Map**.
Scroll (optional)	n/a	Controls the rate of scrolling of the emissive map in the U and V direction.

- Lit Decal Normal Gloss Reveal
  This shader was created for adding flowing water on opaque surfaces. With that in mind, it only uses a normal, gloss, and reveal map.

Special Slot	Texture Size	What to put in this slot
Reveal Map	1024 (8 ppi, grayscale)	Much like the other reveal maps, this one is a height map that modulates the way the alpha is blended with the underlying surface. White parts of this map are the highest and will be the most persistently visible.
Normal Map	256 (16 ppi or higher)	This map is tiled and scrolled twice to proved the water surface with its ripply appearance.
Scale U & V	n/a	These control the number of times the normal map is tiled on the surface.
Layer1 Scroll U & V	n/a	These control the speed and direction of the scrolling for the **first** layer of the normal map.
Layer2 Scroll U & V	n/a	These control the speed and direction of the scrolling for the **second** layer of the normal map.
Layer1 & Layer2 Height	n/a	These control the height of the normal map for the first and second layers respectively.

- Lit Decal Advanced Fullspec
- Lit Decal Specular Fullspec

Two new decal shaders have been added to enable the creation of assets like oil slicks.

Lit Decal Advanced Fullspec

This is just like lit decal advanced, except it uses a full color specular map instead of the grayscale specular mask. This material would be used to create an oily mud decal, something where you need to get the oil slick spec AND override the diffuse, gloss, and normal as well.

Lit Decal Specular Fullspec

This decal replaces only the spec map of the material that is underneath the decal. It uses a full color specular map so you can put an oily sheen on any other material. This material is pretty much only good for adding oily spec.

Use **lit decal specular fullspec** if you just need to add an oily sheen onto an existing material because this decal will replace only the specular map. **Lit decal advanced fullspec** is meant to replace the entire underlying material with a new material that uses a full color spec map.

Special Slot	Texture Size	What to put in this slot
Specular Map	1024 (8 ppi, RGB)	This is your classic, full color specular map. Make sure you use values from the specular color color picker for all metallic surfaces and use 56 grey for all non metallic surfaces. In the case of an oil slick, this is where you would put the crazy irridescent colors. For **lit decal specular fullspec**this map also needs to contain an alpha channel to control where the decal is visible.

- Lit Nocull
- Lit Nocull Advanced
- Lit Detail Nocull
- Lit Detail Nocull Advanced
- Lit Transparent Nocull
- Lit Transparent Nocull Advanced

No cull shaders are very dangerous. No matter what, you have doubled the cost of this surface because both the front and back faces always render. With the transparent no cull shaders, you instantly have two layers of overdraw and two layers written into the OIT buffer, absolutely terrible.
There are VERY few cases where you actually need a no cull shader. These shaders have no unique slots, so the standard texturing guidelines for the lit shaders apply here.

Effect

Effect Cloud

These shaders are used exclusively on effects for particle clouds (i.e., a particle instanced across the vertices of the particle cloud model). There's no supported emissive particle

cloud. Due to their expense, it's suggested that particle clouds only be used for weather effects or in other cases where it's necessary to have thousands of small particles onscreen.

- **effect_cloud_emissive_add** - deprecated (so don't use it)
- **effect_cloud_lit_blend** - a lit particle cloud that uses a blend operation.
- **effect_cloud_lit_blend_dyn_shadow** - a lit particle cloud that uses a blend operation and is affected by * dynamic shadows (but does not cast shadows).
- **effect_cloud_lit_blend_nocull** - a lit particle cloud that uses a blend operation and is not backface culled.
- **effect_cloud_lit_blend_nocull_dyn_shadow** - a lit particle cloud that uses a blend operation, is not backface culled and is affected by dynamic shadows.
- **effect_cloud_lit_blend_nocull_outdoor** - a lit particle cloud that uses a blend operation, is not backface culled, and only renders outside of buildings in outdoor volumes.
- **effect_cloud_lit_blend_nocull_outdoor_dyn_shadow** - a lit particle cloud that uses a blend operation, is not backface culled, only renders outside and is affected by dynamic shadows.

Shader Slot	Texture Size	What to put in this slot
Color Map	8-64 (16-bit, RGB and alpha)	A texture with color information between 40 and 240 and optionally an alpha from 0-255. The color range may need to be compressed to higher ranges if it's necessary to animate the color override.
Filter Mode	n/a	Set by default to aniso2x (mip linear). If it's necessary for the particles in this cloud to fill at least one pixel so they don't get lost, then set this to nearest (mip nearest) or linear (mip nearest).
Tile Mode	n/a	Set to no tile.
Z Feather Depth	n/a	Sets the amount of z-feathering to apply to each particle. This is usually not necessary for particle clouds.

Effect Distortion

These shaders are used for particles that need to be lit but do not emit any light of their own, such as smoke, dust and rock.

- **effect_lit_blend** - a lit billboard sprite that uses a blend operation.
- **effect_lit_blend_nocull** - a lit billboard sprite that uses a blend operation and isn't backface culled.

Shader Slot	Texture Size	What to put in this slot
Color Map	4096 max (16-bit, RGB and alpha)	An image with color information between 40 and 240 and optionally an alpha from 0-255. The color range may need to be compressed to higher ranges if it's necessary to animate the color override.
Tile Mode	n/a	Set to no tile if this material will not be used in geotrails. Set to tile both* if it might be used in geotrails.
Filter Mode	n/a	Set by default to aniso2x (mip linear).
ShadowTransparency	n/a	Sets the darkness of a shadow cast by a particle using this material if Cast Shadows is enabled for its emitter in Radiant > FX Properties > Visuals > General. A value of 0 is no shadow, 16 is a medium shadow (useful for light smokes) and 32 is the darkest shadow (useful for thick, heavy smokes).
Levels Input (Shadow, Highlight)	n/a	Applies levels adjustment for contrast. The range is 0 - 255 for each field, although Shadow should be less than Highlight. These values should reproduce the results that Photoshop levels given these same values would produce on this texture. Default values are (0, 255). When these properties are using any other values, this material is 10% more expensive.
Levels Output (Shadow, Highlight)	n/a	Applies levels adjustment for value range, so this sets the lowest color value and the highest color value for this texture. The range is 0 - 255 for each field, although Shadow should be less than Highlight. These values should reproduce the results that Photoshop levels given these same values would produce on this texture. Default values are (0, 255). When these

Shader Slot	Texture Size	What to put in this slot
		properties are using any other values, this material is 10% more expensive.
Desaturation	n/a	When this is 0, the texture's color saturation is unaffected. When this is 1, the texture's color is fully desaturated. Values in between are valid and will linearly interpolate between these limits. Default value is 0. When this property is using any other value, this material is 10% more expensive.
Row Count	n/a	The number of rows in the texture atlas. This needs to match the Row Count in the image referenced in Color Map. If this is not an animated texture, this should be set to 1.
Column Count	n/a	The number of columns in the texture atlas. This needs to match the Column Count in the image referenced in Color Map. If this is not an animated texture, this should be set to 1.
Falloff (Begin, End)	n/a	The number of degrees from the view angle to the sprite's normal where the sprite is completely visible (Begin) and the number of degrees from the view angle to the sprite's normal where the sprite is completely invisible (End). The particle's alpha linearly fades from Falloff Begin to Falloff End.This only affects particles that can rotate in 3D space (tails, lines, rotated sprites, oriented sprites and geotrails). A good starting value is (45, 75). To disable, set this to (0, 0). Setting Falloff Begin (Begin, End) to (90, 90) will prevent the material from rendering.

Effect Lit Emissive

These shaders are used for particles that may or may not need to be lit but do need to emit their own light, such as fire, lasers, tracers and light glows. These have all the same attributes as Effect Lit Blend, but also have an emissive mask and an intensity value.

- **effect_lit_emissive_blend** - a lit billboard sprite that uses a blend operation and an emissive mask to ramp up its intensity.
- **effect_lit_emissive_blend_nocull** - a lit billboard sprite that uses a blend operation and an emissive mask to ramp up its intensity and is not backface culled.

Shader Slot	Texture Size	What to put in this slot
Color Map	4096 max (16-bit, RGB and alpha)	An image with a muted color range. Most of the color information in this texture will be amplified by the Emissive Mask and Intensity, so do not use bright colors. A good method to keep colors in the correct range is to use LAB colors with a luminance of 50 when authoring the texture.
Emissive Mask	4096 max (16-bit, grayscale)	A grayscale image whose Image Usage is revealMap with luminance values that range from 0-255. There should be a sharp ramp from low to high values so that only the hottest areas of the Color Map get the full 255 emissiveness. The brightest areas of this mask will also add to the alpha of the Color Map, so even very faint pixels can become opaque. Ideally, the emissive mask will not be derived from any of the Color Map's channels. If it is, there is a chance that the duplicated pixel information will overlay and reveal compression artifacts or punch up the edge pixels of the alpha mask. It may be necessary to paint these manually or apply some manner of filter that shifts the pixels enough to not cause artifacting. This image can usually be half the resolution of the Color Map.
Intensity	n/a	An integer that represents how bright the Emissive Mask will make the Color Map. It can have a value from 0-12,000. Light glows are set at 16. Fires are set at 256. The sun would have a value of 10,000. This is the same value that lights use to determine how bright they are, so the values are similar.
Physically Based Emissive behavior	n/a	Enables this material to emit light at one consistent value instead of adjusting to remain visible across EV values.

Effect Lit Scroll Emissive Blend

These shaders are used when advanced behaviors are required, like scrolling an emissive mask or RGB channels. These could be used to make cloud layers, fake flowing water and much, much more! Note that these shaders are not compatible with compute sprites, so FX Properties > Visuals > General > Don't use compute sprites must be enabled in Radiant.

- **effect_lit_scroll_emissive_blend** - a lit billboard sprite that uses a blend operation and an emissive mask to ramp up its intensity. It also allows UV scrolling, rotation, scaling and offsetting for Emissive masks and Color channels and the definition of a separate, non-animated alpha mask.
- **effect_lit_scroll_emissive_blend_nocull** - a lit billboard sprite that uses a blend operation and an emissive mask to ramp up its intensity and is not backface culled. It also allows UV scrolling, rotation, scaling and offsetting for Emissive masks and Color channels and the definition of a separate, non-animated alpha mask.
- **effect_lit_scroll_emissive_blend_specular** - a lit billboard sprite that uses a blend operation, an emissive mask to ramp up its intensity and a normal map for specularity. It also allows UV scrolling, rotation, scaling and offsetting for Emissive masks and Color channels and the definition of a separate, non-animated alpha mask.
- **effect_lit_scroll_emissive_blend_specular_nocull** - a lit billboard sprite that uses a blend operation, an emissive mask to ramp up its intensity, a normal map for specularity and is not backface culled. It also allows UV scrolling, rotation, scaling and offsetting for Emissive masks and Color channels and the definition of a separate, non-animated alpha mask.

Shader Slot	Texture Size	What to put in this slot
Alpha Mask	4096 max (16-bit, grayscale)	A grayscale image whose Image Usage is revealMap with luminance values that range from 0-255. This mask is multiplied against the alpha channel in the Color Map for the final alpha value. Use this texture to mask off the sprite's edges when the Color Map is scrolling.
Scroll (U, V)	n/a	The speed at which a material will scroll in U and V directions. Higher numbers mean faster scrolling. Valid values are -360 to 360. Default values are (0, 0).
UV	n/a	The initial rotation in degrees (the first field), and the rate at

Shader Slot	Texture Size	What to put in this slot
Rotation, Spin Rate		which it rotates (the second field). The origin of the rotation is likely the center of the image. Valid values are -360 to 360. Default values are (0, 0).
Scale (U, V)	n/a	The scale of the texture in U and V. A value less than 1 repeats the texture more often in the sprite and a value greater than 1 repeats the texture less often. This is not an animated property. Valid values are 0.125 to 64. Default values are (1, 1). When this property is set in Alpha Parameters, it only applies when used on a geotrail, laser or beam code-generated geometry. When an alpha mask is used on a sprite, its scale is always (1, 1).
Offset (U, V)	n/a	The offset of the texture in U and V. This is not an animated property. Valid values are -10 to 10. Default values are (0, 0).
Normal Map	4096 max (16-bit, RGB)	A color image whose Image Usage is normalMap. This map is used for generating specular highlights.

FXAnim

These shaders have special features that allow the FXAnim artists to create the animated props that are necessary for our levels.

- Lit Flag
- Lit Flag Advanced
- Lit Flag Transparent
- Lit Flag Transparent Advanced

The lit flag shaders use the vertex color to control two aspects of the shader:

1. The vertex green channel controls the amplitude of the wind ripples through the mesh.
2. The vertex color's red channel controls the blend from the diffuse map to the fray map.
    - Lit flag and Lit Flag Advanced support alpha test. The transparent shaders use an alpha punch (alpha test with a slightly blended edge). The transparent versions of the shaders are more expensive because they add layers of overdraw and eat into the OIT buffer, use them only if necessary.

- The advanced versions of each shader are only necessary if you are making a metallic tarp.

Shader Slot	**Texture Size**	**What to put in this slot**
Diffuse Texture	1024 (8 ppi, alpha)	a texture with the color of the material *without any lighting information*
Occlusion	512 (grayscale)	leave this blank unless your surface has deep crevices, or occluding surface geometry, or is very glossy and you need to block part of the reflection probe. Values in this texture only affect two things, the amount of ambient light that will light the surface and the amount of reflection probe that will visible on the surface
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Detail Normal	256 (16 ppi or more)	tiled geometry details larger than 1/8" and smaller (scratches)
Gloss Map	1024 (0-255 grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Specular Map	1024 (8ppi, grayscale)	Use this slot to define your metal and non metal areas. This slot will be used as a reveal texture to define which areas will be lit shaded as non metals, and which will be metal. The non-metal areas should be fully black, the metal areas should be white. The shader uses this map as a metalness mask. White will fully use the metallic color in the **Specular Tint** color picker, black will use specular simple.
Fray Map	512 (Color and alpha)	same rules as the diffuse texture. This is used to provide some extra detail to the frayed parts of the cloth or flag. Shows up where there is more red in vertex color.
Ripple Normal	256 (16 ppi)	Tiled and scrolled across the surface twice to provide detailed wind motion. Controlled by **Scroll Speed1, Scroll Speed2, Ripple Scale,** and**Ripple Height.**

Shader Slot	Texture Size	What to put in this slot
Wind DIrection	n/a	There are three directions (**Direction1, Direction2, Direction3**) that blend together in world space to provide the final wind effect through the flag.
Flag Speed	n/a	the speed that the flag flaps in the wind.
Flag Phase	n/a	an offset to the functions that calculate the ripples in the flag vertices. Allows variation amongst similar flags.
Backlight Bleed	n/a	Amount of light that bleeds through from the backside of the flag (thicker or metallic materials will have less of this).
Albedo Tint	n/a	Controlled by the alpha channel of the **Color Map**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map** in the places where the alpha of the **Color Map** is non-zero.
Crack Tint	n/a	Just like the **Albedo Tint** except it is not masked and applied to the entire **Crack Map**.

- Lit FXANIM Cracks
- Lit FXANIM Cracks Advanced

Shader Slot	Texture Size	What to put in this slot
Diffuse Texture	1024 (8 ppi, alpha)	a texture with the color of the material *without any lighting information*
Occlusion	512 (grayscale)	leave this blank unless your surface has deep crevices, or occluding surface geometry, or is very glossy and you need to block part of the reflection probe. Values in this texture only affect two things, the amount of ambient light that will light the surface and the amount of reflection probe that will visible on the surface
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed

Shader Slot	Texture Size	What to put in this slot
Detail Normal	256 (16 ppi or more)	tiled geometry details larger than 1/8" and smaller (scratches)
Gloss Map	1024 (0-255 grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Specular Map (optional)	1024 (8ppi, grayscale)	Use this slot to define your metal and non metal areas. This slot will be used as a reveal texture to define which areas will be lit shaded as non metals, and which will be metal. The non-metal areas should be fully black, the metal areas should be white. The shader uses this map as a metalness mask. White will fully use the metallic color in the **Specular Tint** color picker, black will use specular simple.
Crack Map	512 (Color and alpha)	same rules as the diffuse texture. This is used to provide some extra detail to the cracked parts of the prop. Shows up where there is more red in vertex color.
Crack Normal	512 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed. Adds detail to the cracked portions of the prop. Shows up where there is more red in vertex color.
Albedo Tint	n/a	Controlled by the alpha channel of the **Color Map**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map** in the places where the alpha of the **Color Map** is non-zero.
Crack Tint	n/a	Just like the **Albedo Tint** except it is not masked and applied to the entire **Crack Map**.

Character

- Skin
- Skin Cinematic
- Skin Tension

These shader have some unique properties to make them behave more like human skin:

- The diffuse lighting is blurred with a weighted kernel to simulate the sub-surface scattering in skin.
- There is backscattering from lights behind the surface.
- The tension version of the shader allows for the usage of tension normal maps, driven by animation.
- The cinematic version allows for the usage of a Bent Normal map to adjust the normal used by the indirect lighting across the surface.

Shader Slot	**Texture Size**	**What to put in this slot**
Diffuse Texture	1024 (8 ppi, alpha)	a texture with the color of the material *without any lighting information*
Occlusion	512 (grayscale)	leave this blank unless your surface has deep crevices, or occluding surface geometry, or is very glossy and you need to block part of the reflection probe. Values in this texture only affect two things, the amount of ambient light that will light the surface and the amount of reflection probe that will visible on the surface
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Detail Normal	256 (16 ppi or more)	tiled geometry details larger than 1/8" and smaller (scratches)
Gloss Map	1024 (0-255 grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Bent Normal (optional)	1024 (8 ppi)	This needs to be baked in a package that supports Bent Normal creation (XNormal, Maya, custom CT tool).
Stretch Normal (optional)	1024 (8 ppi)	the normal that shows the creases that occur when the mesh is stretched by animation. The effect of this map is scaled by **Stretch Height**.
Compression	1024 (8 ppi)	the normal that shows the creases that occur when the mesh is

Shader Slot	Texture Size	What to put in this slot
Normal (optional)		compressed by animation. The effect of this map is scaled by**Compression Height**.
Tension Power (optional)	n/a	This controls how quickly the tension values ramp from neutral to either compressed or squashed.
Tension Strength (optional)	n/a	A global scale that controls the degree of effect from both the compression and stretch tension maps.

- Cloth
- Cloth Alphatest
- Cloth Multi Detail
- Cloth Multi Detail Alphatest

These shaders modify the textures based on the view angle before they are written to the GBuffer in order to simulate the unique properties of cloth.

- The diffuse lighting is slightly ramped up at grazing angles.
- The specular lighting is slightly dampened at direct viewing angles and takes on the diffuse color tint at grazing angles.

The Multi Detail version of cloth allows you to selectively use up to four independent detail maps. If you need to represent multiple weaves, or textures, of cloth in one material, this is the way to go. The Detail Mask has four channels that each ramp up one of the detail normal maps. These detail normal maps do not blend with each other (red beats green, green beats blue, blue beats alpha in the detail mask) but the channels in the detail mask will control the blend of the detail normal with the base normal.*

The alpha test version of each of the cloth shaders allows you to represent frayed edges without having to pay the overdraw price of full transparency.

Shader Slot	Texture Size	What to put in this slot
Diffuse Texture	1024 (8 ppi, alpha)	a texture with the color of the material *without any lighting information*
Occlusion	512 (grayscale)	leave this blank unless your surface has deep crevices, or occluding surface geometry, or is very glossy and you need to block part of the reflection probe. Values in this texture only

Shader Slot	Texture Size	What to put in this slot
		affect two things, the amount of ambient light that will light the surface and the amount of reflection probe that will visible on the surface
Normal	1024 (8 ppi)	unique geometry details larger than 1/4" or leave blank if not needed
Detail Normal	256 (16 ppi or more)	tiled geometry details larger than 1/8" and smaller (scratches). In the case of the multi detail cloth, there are slots for up to four detail normal maps. Each detail normal has its own **Height** and **Scale** controls to allow them to tile at different scales and have varying levels of effect.
Gloss Map	1024 (0-255 grayscale)	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Specular Map	1024 (8ppi, grayscale)	Use this slot to define your metal and non metal areas. This slot will be used as a reveal texture to define which areas will be lit shaded as non metals, and which will be metal. The non-metal areas should be fully black, the metal areas should be white. The shader uses this map as a metalness mask. White will fully use the metallic color in the **Specular Tint** color picker, black will use specular simple.
Detail Mask (optional)	1024 (8ppi, four grayscale channels)	This controls the blending of each detail normal with the base normal map in the Multi Detail cloth shader. The red channel beats the green channel, the green channel beats the blue channel, and the blue channel beats the alpha channel. Only one detail normal will be used at each pixel, so if you were to paint this mask completely white, you would see the detail normal controlled by the red channel blend with the base normal at full strength.
Velveteen	n/a	Ramps from 0 - 1 to control how "clothy" the material is. At 0, this shader will not differ in its lighting from the standard lit

Shader Slot	Texture Size	What to put in this slot
		shaders. Ramped all the way to 1, this control will dampen the spec at direct viewing angles, tint the spec to the diffuse color at grazing angles, and boost the diffuse lighting at grazing viewing angles.
Velveteen Mask	1024 (0-255 grayscale)	Modulates the velveteen value that is set in the spinner. The spinner can be seen as the maximum velveteen value and this mask allows you to have different types of cloth on the same material.

Eye
Custom shader for use on character eyeballs.

Shader Slot	Texture Size	What to put in this slot
Diffuse Texture	8 ppi	a texture with the color of the material *without any lighting information*
Ambient Occlusion	grayscale	leave this blank unless your surface has deep crevices, or occluding surface geometry, or is very glossy and you need to block part of the reflection probe. Values in this texture only affect one thing, the amount of ambient light that will light the surface.
Specular Occlusion	grayscale	leave this blank unless your surface has deep crevices, or occluding surface geometry, or is very glossy and you need to block part of the reflection probe. Values in this texture only affect one thing, the amount of reflection probe that will visible on the surface
Normal	8 ppi	unique geometry details larger than 1/4" or leave blank if not needed
Gloss Map	0-255 grayscale	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your

Shader Slot	Texture Size	What to put in this slot
		surface
Iris Displacement	grayscale	controls the depth of the parallax effect under the cornea at a per pixel level. Works in combination with **Iris Depth** and **Corneal Refraction** to create the final degree of iris parallax under the cornea.

Hair
Specifically adds anisotropic highlights for better specular performance of hair.

Shader Slot	Texture Size	What to put in this slot
Diffuse Texture	8 ppi	a texture with the color of the material *without any lighting information*
Occlusion	512 (grayscale)	This can be used to create darkening at the hair roots. Values in this texture only affect two things, the amount of ambient light that will light the surface and the amount of reflection probe that will visible on the surface
Normal	8 ppi	unique geometry details larger than 1/4" or leave blank if not needed
Gloss Map	0-255 grayscale	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Aniso Amount	n/a	Used to control the degree and direction of the anisotropic highlight. At 0, you will get the standard round specular highlight. At -1 the highlight will stretch in the U direction of the UV coordinates on your mesh. At 1 the highlight will stretch in the V direction of the UV coordinates on your mesh.

Vehicles and Weapons

These shaders form the core of the weapon and vehicle shaders. However, there is no reason that they could not be used on any surface as long as the cost is bearable.

All of these shaders use a full color specular map because both vehicles and weapons tend to combine multiple metals, coated metals, metallic surfaces, and strange future weirdness.

- Lit Vehicle
- Lit Weapon

These two shaders are virtually identical with the weapon shader adding a slot for a camo map.

Shader Slot	**Texture Size**	**What to put in this slot**
Diffuse Texture	8 ppi, with alpha	a texture with the color of the material *without any lighting information.* Alpha channel controls the albedo tinting.
Occlusion	grayscale	useful for deep crevices, or occluding surface geometry, or a very glossy surface where you need to block part of the reflection probe. Values in this texture only affect two things, the amount of ambient light that will light the surface and the amount of reflection probe that will visible on the surface
Normal	8 ppi	unique geometry details larger than 1/4" or leave blank if not needed
Detail Normal	16 ppi or more	tiled geometry details larger than 1/8" and smaller (scratches). In the case of the multi detail cloth, there are slots for up to four detail normal maps. Each detail normal has its own **Height** and **Scale** controls to allow them to tile at different scales and have varying levels of effect.
Detail Mask	8 ppi, four grayscale channels	This controls the blending of each detail normal with the base normal map in the Multi Detail cloth shader. The red channel beats the green channel, the green channel beats the blue channel, and the blue channel beats the alpha channel. Only one detail normal will be used at each pixel, so if you were to paint this mask completely white, you would see the detail normal controlled by the red channel blend with the base normal at full strength.
Gloss Map	0-255 grayscale	the sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range

Shader Slot	Texture Size	What to put in this slot
		regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Specular Map	8 ppi, color	Use only approved values from the Photoshop Palette. Start off with everything set to specular simple (56, 56, 56) and then add patches of color as needed to account for the metallic or iridescent parts of the surface.
Albedo Tint	n/a	Controlled by the alpha channel of the **Color Map**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map**in the places where the alpha of the **Color Map** is non-zero.

Lit Vehicle Advanced

Better known as the carpaint shader. This shader changes up the way the lighting is handled and adds textures to better simulate a glossy car paint surface with metal flakes embedded in the clear coat.

- The specular lighting represents the metal flakes and uses the Flake Gloss and Flake Spec Color where the flake mask indicates.
- The reflection probe represents the clear coat and uses the Clearcoat Gloss.

Shader Slot	Texture Size	What to put in this slot
Diffuse Texture	8 ppi, with alpha	a texture with the color of the material *without any lighting information*. Alpha channel controls the albedo tinting and the usage of the clear coat gloss. You can conceive of the alpha channel as the carpain mask: where the alpha is non-zero will be treated as car paint and get all the features.
Occlusion	grayscale	useful for deep crevices, or occluding surface geometry, or a very glossy surface where you need to block part of the reflection probe. Values in this texture only affect two things, the amount of ambient light that will light the surface and the amount of reflection probe that will visible on the surface

Shader Slot	Texture Size	What to put in this slot
Normal	8 ppi	unique geometry details larger than 1/4" or leave blank if not needed
Detail Normal	16 ppi or more	tiled geometry details larger than 1/8" and smaller (scratches). In the case of the multi detail cloth, there are slots for up to four detail normal maps. Each detail normal has its own **Height** and **Scale** controls to allow them to tile at different scales and have varying levels of effect.
Detail Mask	8 ppi, four grayscale channels	This controls the blending of each detail normal with the base normal map in the Multi Detail cloth shader. The red channel beats the green channel, the green channel beats the blue channel, and the blue channel beats the alpha channel. Only one detail normal will be used at each pixel, so if you were to paint this mask completely white, you would see the detail normal controlled by the red channel blend with the base normal at full strength.
Gloss Map	0-255 grayscale	The sub-pixel roughness of the material – this is the is the microscopic roughness of the surface. Paint this values full range regardless of glossiness so that black represents the roughest part of your surface and white represents the smoothest part of your surface
Specular Map	8 ppi, color	Use only approved values from the Photoshop Palette. This map is overridden by the **Flake Spec Color** where the **Flake Mask Map** is white. Start off with everything set to specular simple (56, 56, 56) and then add patches of color as needed to account for the metallic or iridescent parts of the surface.
Flake Normal	16 ppi or higher	A small tiling normal map to represent the random directions of the metal flakes suspended in the clear coat. This normal overrides the base normal when the **Flake Mask Map** is white.
Flake Mask	16 ppi or higher	Controls where the flake normal, flake spec color, and flake gloss are to be used.
Albedo Tint	n/a	Controlled by the alpha channel of the **Color Map**. Applies a color tint to the diffuse map by multiplying the selected color onto the **Color Map**in the places where the alpha of the **Color Map** is non-zero.