Specular is direct and indirect reflections which can be made glossy (blurred).

**Color**

The color the specular reflection will be modulated with. Use this color to ‘tint’ the specular highlight. You should only use colored specular for certain metals, whereas non-metallic surfaces usually have a monochromatic specular color. Non-metallic surfaces normally do not have a colored specular.

- Aluminium: R:128 G:126 B:121
- Chrome: R:139 G:139 B:145
- Copper: R:251 G:165 B:139
- Gold: R:252 G:201 B:88
- Silver: R:247 G:244 B:235
- Titanium: R:140 G:127 B:114
- Tungsten: R:128 G:125 B:121

**Weight**
The specular weight. Influences the brightness of the specular highlight.

**Specular Weight 0 to 1**

**Roughness**

Controls the glossiness of the specular reflections. The lower the value, the sharper the reflection. In the limit, a value of 0 will give you a perfectly sharp mirror reflection, whilst 1.0 will create reflections that are close to a diffuse reflection. You should connect a map here in order to get variation in the specular highlight.

**Specular Roughness 0-1**

The 'microscopic' features of a surface affect the diffusion and reflection of light. This 'microsurface' detail has the most noticeable effect on specular reflections. In the diagram below, you can view parallel lines of incoming light commence to diverge when reflected from rougher surfaces, when each ray hits a part of the surface with a different orientation. In summary, the rougher the surface becomes, the more the reflected light will diverge or appear 'blurred'.
The diagram above shows 'microsurface' detail represented as a general measure of roughness (this surface would have a high Specular Roughness value).

The brightness of the Specular highlight is automatically linked to its size due to the Standard shader's energy conserving nature. In the example below, all of the materials are reflecting the same amount of light, but the rougher surface is spreading it out in multiple directions. However, with low amounts of roughness the surface is reflecting a more concentrated amount of light.

To get variation in the highlights of the surface, a map should be connected to the Specular Roughness. This will influence not only the brightness of the highlight but also its size and the sharpness of the environmental reflection.
Anisotropy

Anisotropy reflects and transmits light with a directional bias and causes materials to appear rougher or glossier in certain directions. The default value for Anisotropy is 0.5, which means 'isotropic'. As you move this control towards 0.0, the surface is made more anisotropic in the U axis, and as you move the control towards 1.0 the surface is made more anisotropic in the V axis.

Anisotropy is suitable for materials that have a clear brush direction such as brushed metal which has tiny grooves in which form a 'stretched' anisotropic reflection.
Many small discs form together to create an effect which is the anisotropic highlight.

Anisotropic reflections are suitable for brushed metal effects such as in the example below:

Texture assigned to Specular Anisotropic Rotation

You may notice faceting appear in specular highlights when using anisotropy. It is possible to remove the faceted appearance by enabling smooth subdivision tangents (via Arnold subdiv_smooth_derivs parameter). Take into account this requires a subdivision iteration of at least one in the polymesh to work.

Faceting seen in the anisotropic highlight


Enable Subdivision and increase Subdivision Iterations to remove anisotropic specular faceting.
Rotation

The rotation value changes the orientation of the anisotropic reflectance in UV space. At 0.0, there is no rotation, while at 1.0 the effect is rotated by 180 degrees. For a surface of brushed metal, this controls the angle at which the material was brushed. For metallic surfaces, the anisotropic highlight should stretch out in a direction perpendicular to the brushing direction.

It is possible to assign textures to specular rotation. When doing so it is advisable to avoid texture filtering. This means disabling MIP-mapping and disabling the magnification filter, which by default is set to "smart bicubic". One way is to set the mipmap_bias of the image node to a strong negative value, like -8, which means "use 8 MIP levels higher resolution than usual".

Microfacet Distribution
Choose between GGX microfacet distribution or Beckmann (default). GGX is a microfacet distribution. It has a sharper peak and a larger tail than Beckmann. GGX is suitable for modeling light reflection from surfaces more realistically.

(Fresnel) Enable

When checked, the reflection level will be dependent on the viewing angle of the surface following the Fresnel equations (which depends on the IOR value). The visual effect is that the reflection increases as the viewer’s angle of incidence, with respect to the surface normal, approaches 0. Fresnel has a large effect on almost all materials such as glass, water and smooth coated surfaces, however Fresnel is just as visually important with less shiny materials.

Reflectance at Normal

The Fresnel effect is more noticeable when using lower values. Increasing this value gives the material a more metallic-like specular reflection. Metals have a more uniform reflectance across all angles compared to plastics or dielectrics, which have very little normal reflectance. Note that the Fresnel effect is less evident when a surface become rougher (the unpredictable nature of a rough surface 'scatters' the Fresnel effect, preventing the viewer from being able to clearly see it). As visible in the images below, objects rendered with a correct Fresnel effect will appear to have brighter specular reflections near the edges.
All types of materials become 100% reflective at grazing angles, as evident in the diagram below:

The examples below show various materials which require **Reflectance at Normal**:

- **Bubble**: Reflectance at Normal 0.03
- **Car paint**: Reflectance at Normal 0.01

For realistic materials, reflectance at normal must be lower than the specular/reflection scale (which controls the reflectance at grazing). Otherwise, you will get a darker reflection at the edges, which is exactly the opposite of the effect seen in nature. It is also not advisable to tint speculars when using Fresnel as this is not physically correct.
Extended Controls

Direct Specular Scale

The amount of specularity received from direct sources only. Values other than 1.0 will cause the materials to not preserve energy and global illumination may not converge.

Indirect Specular Scale

The amount of specularity received from indirect sources only. Values other than 1.0 will cause the materials to not preserve energy and global illumination may not converge.