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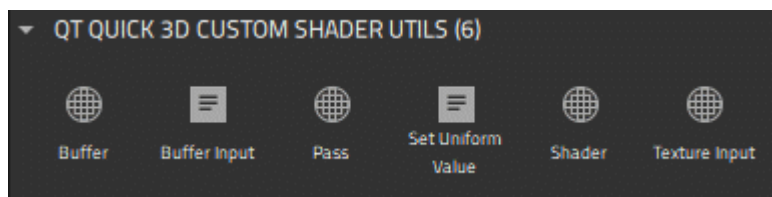
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Custom Shaders

You can use the 3D shader utilities and commands available in > **Components** > **Qt Quick 3D** > **Qt Quick 3D Custom Shader Utilities** to create your own effects and materials.

If the custom shader utilities are not displayed in **Components**, add the **QtQuick3D** module to your project, as described in Adding and Removing Modules.

Note: If you select **Qt 5** as the **Target Qt Version** when creating your project, the available custom shader utilities and their properties will be slightly different, and some of the components can be found in different locations in **Components**.

You can find additional shader utilities, the **Effect** and **Custom Material** components, in **Components** > **Qt Quick3D** > **Qt Quick 3D**.
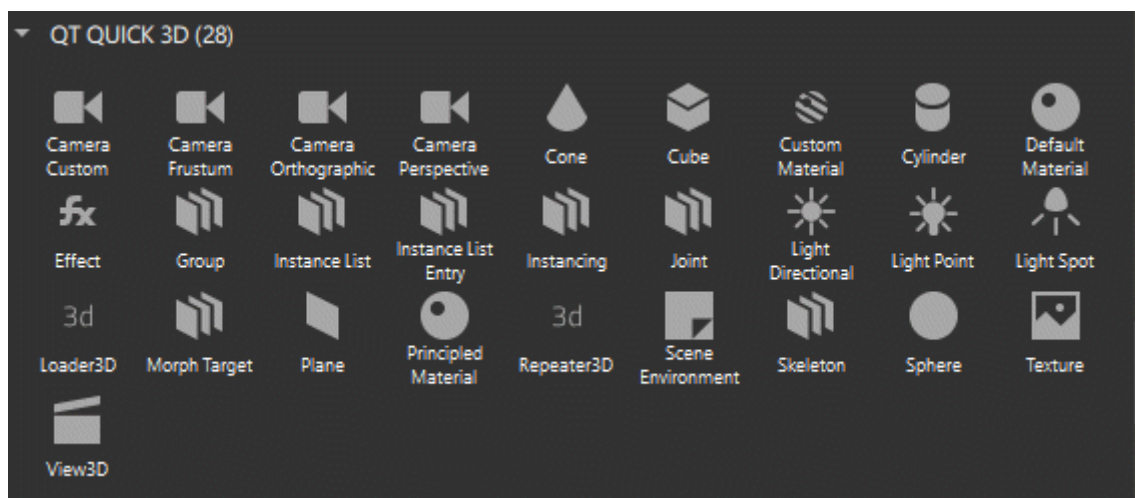
Note: In Qt 5 the **Effect** component is located in **Qt Quick 3D Effects** > **Qt Quick 3D Custom Shader Utilities**. To use the **Effect** component, add the **QtQuick3D.Effects** module to your project.

Note: In Qt 5 the **Custom Material** component can be found in **Qt Quick 3D Materials** > **Qt Quick 3D Custom**

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For more information about using the shaders, see Custom Effects and Materials.

See the following tables for available shader utilities and commands.

Available Custom Shader Utilities

Custom Shader	Qt 5 Only	Description
Buffer		A buffer to be used for a pass of **Custom Material** or **Effect** instances. The **Name** property identifies the **Buffer** instance. When the value of this property is empty, the buffer will refer to the default output texture of the render pass instead of allocating a buffer. This can be useful to override certain settings of the output, such as the texture format, without introducing a new, separate intermediate texture. The **Format** property specifies the format of the buffer. The **Filter** property specifies the filter operation when a render pass is reading a buffer that differs in size in comparison to the current output buffer. The **Coordinate operation** property specifies the texture coordinate operation for coordinates outside [0, 1] range. Select the **ClampToEdge** operation to clamp coordinates to edges. The **Repeat** operation wraps the coordinates at the edges to tile the texture, while **MirroredRepeat** also mirrors every other repeat of the texture while tiling it. The **Allocation flags** property defines allocation flags for the **Buffer** instance. Select **SceneLifeTime** to allocate the buffer for the whole lifetime of the scene. **Size multiplier** specifies the size of the **Buffer** instance. Value of 1.0 creates a buffer with the same size, while 0.5 creates a buffer with width and height halved.
Custom Material		The base component for creating custom materials used to shade model instances. The **Shading mode** property specifies whether the material is **Shaded** or **Unshaded**. The **Vertex shader** and **Fragment shader** properties define the vertex and fragment shader files for the material. Select the shader files from the dropdown menus. You can select ⊕ to add new shader files to the dropdown menus. The **Source blend** and **Destination blend** properties specify the source and destination blend factors. The **Always dirty** property determines whether the material is refreshed every time it is used. The **Line Width** property defines the width of the lines when the geometry is using lines or line strips. Specify the attributes of the **Custom Material** by defining the **Transparency**, **Refraction** and **Always dirty** properties. The **Shader Info** specifies the shader info of the material. For more information, see Custom Effects and Materials. **Note:** In Qt 5 you can also define render passes for **Custom Material** instances by using the **Passes** property, which lists render passes implemented by the material.
Effect		A base component for creating post-processing effects. The **Passes** property contains a list of render passes implemented by the effect. You can add more entry fields to the list by selecting ＋ . For more information, see Custom Effects and Materials.
Pass Custom Shader	Qt 5 Only	A render pass of an **Effect** instance. In Qt 5 you can also use render passes for **Custom Materials**. The **Commands** property specifies the list of render commands for the **Pass** instance, while the Description

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The **Buffer** property specifies an output buffer for the **Pass** instance.

Shader		A container component for defining shader code used by **Effect** instances. The **Source** property specifies the shader file to be used by the **Shader** instance, and the **Stage** property defines a **Vertex** or **Fragment** stage for it. **Note:** In Qt 5 you can also set the **Stage** property to **Shared**, **Geometry**, or **Compute**.
Shader Info	✓	Basic information about custom shader code for Custom Materials. The **Version** property specifies the shader code version, while the **Type** property defines the shader code type. The **Key** property specifies the options used by the shader using the combination of shader key values, such as diffuse or specular lighting, refraction, transparency, displacement, transmissiveness, glossiness, and alpha cutout. The **Key** property specifies the options used by the shader using the combination of shader key values. Use the dropdown list to select the one of available shader keys: > The **Diffuse** shader key applies diffuse lighting and **Specular** applies specular lighting to the shader instance. > The **Cutout** shader key applies alpha cutout to the shader instance. > The **Refraction** shader key applies refraction to the shader instance, while using the **Transparent** key applies transparency to the shader instance. > The **Displace** shader key applies displacement mapping to the shader instance. > The **Transmissive** shader key applies transmissiveness to the shader instance. > The **Glossy** shader key applies glossiness to the shader instance by default. This shader key is a combination of **Diffuse** and **Specular** keys.
Texture Input		A texture channel for **Custom Material** and Effect instances. The **Texture** property specifies the texture to input, while **Enabled** determines whether the texture is enabled. In **Effect** instances, setting **Enabled** to **false** causes the shaders to sample a dummy, opaque black texture instead of the one specified by texture.

Available Custom Shader Commands

Command	Qt 5 Only	Description
Blending	✓	A pass command that specifies the source blending function. The **Source** property specifies the source blending function, while the **Destination** property specifies the destination for it.
Buffer Blit	✓	A copy operation between two buffers in a pass of a Custom Material or an Effect. The **Source** and **Destination** specify the source and the destination buffers for the copy-operation.
Buffer Input		An input buffer to be used for a pass of a Custom Material or an Effect. The **Buffer** property specifies the input buffer for an instance of the **Pass** instance. The **Parameter** specifies the name of the input parameter in the shader.
Cull Mode ~~Command~~	Qt 5 Only	A culling mode for a render pass. ~~Description~~ The **Mode** property specifies the culling mode in a pass when the **State** property of the **Render**

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Depth Input	✔	An output texture for the depth buffer. The **Parameter** property specifies the name of the texture the depth buffer will bind to.
Render State	✔	The render state to be enabled or disabled in a pass of a **Custom Material** or an **Effect** instance. The **State** property specifies the render state to enable or disable in a pass. Use the dropdown menu to set the **State** to **Blend**, **CullFace**, **DepthTest**, **StencilTest**, **ScissorTest**, **DepthWrite**, or **Multisample**. The **Enabled** property defines the **Enable** state for the **Render State**.
Set Uniform Value		A value to be set during a single pass. The **Target** property specifies the name of the uniform that will have its value changed during the pass, while the **Value** specifies the value that will be set on the target uniform.

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