



The Enhanced Velocity String System (EVSS) is an integrated design approach to optimize wellbore configurations. The system is designed to extend the economic life of gas wells which may become loaded with produced fluids. The purpose of the EVSS is to configure the wellbore to allow for a number of production scenarios. These production scenarios may include any combination of slug unloading, jet assisted fluid lifting and multiple flow path velocity string production.

A typical EVSS installation, as depicted below, shows a well loaded with water (Fig. 1). The first step of returning a liquid loaded gas well to production would be to slug unload the liquid out of the wellbore (Fig. 2). The slug unloading process requires the injection of gas into the coiled tubing/tubing annulus, at a pressure higher than the reservoir pressure, to circulate the liquid out of the tubing. When gas is injected to unload the well, a check valve at the bottom of the coiled tubing string closes and prevents fluid in the well from being forced back into the reservoir.

Once the liquid has been slug unloaded out of the tubing, gas injection into the coiled tubing/tubing annulus can be continued to remove any other fluid remaining in the well. This is achieved by utilizing the jet assist tool that is run in the well as part of the EVSS (Fig. 3). The jet assist tool works as the injected gas passes through a nozzle which produces a negative pressure differential between the bottom of the tubing and the inside of the coiled tubing string. This pressure differential unseats the check valve at the bottom of the coiled tubing and draws the wellbore fluid from outside the tubing into the coiled tubing string. Once inside the coiled tubing, the fluid is carried to surface with the gas.

When all the load water has been removed from the wellbore, and if the reservoir pressure is strong enough, the well can be placed on velocity string production (Fig. 4). The multiple production flow paths available allow for velocity lift optimization as the reservoir energy is depleted throughout the life of the well.

An EVSS is designed to give the operator a number of options to ensure that gas wells that have begun to produce fluids can be unloaded and economically produced for an extended length of time.

■ Water   
 ■ Injection Fluid   
 ■ Production   
 A Casing Annulus   
 B Coiled Tubing/Tubing Annulus   
 C Velocity String

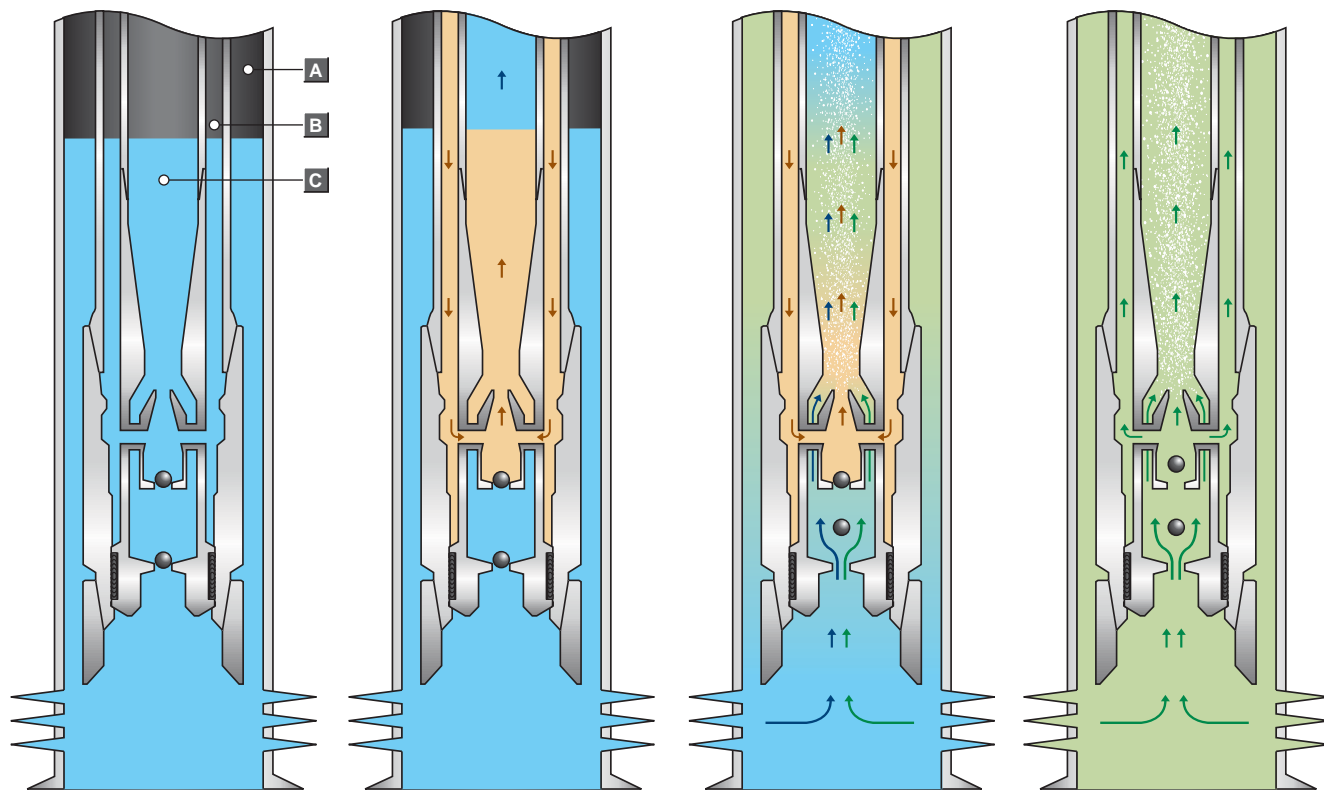


Fig.1  
Loaded Condition

Fig.2  
Slug Unloading

Fig.3  
Jet Unloading

Fig.4  
Velocity Production