

The Lease Pumper's Handbook

Chapter 9 Gas Lift

Section B

CONVENTIONAL MANDRELS

When installing the gas lift system, the first decision is in selecting either the conventional or side-pocket mandrel arrangement. This section reviews the conventional system, and Section C discusses side-pocket mandrels.

B-1. Conventional Mandrel and Tubing Arrangements.

Conventional gas lift tubing mandrels (Figure 1) have external ported lugs to accept the gas valves. The valves are installed on the outside of the gas lift mandrel, which is inserted at appropriate depths in the tubing string. The mandrel and gas lift valves are run into the well as part of the tubing string. To service these valves, the tubing string must be pulled out of the hole by a well servicing crew.

The conventional gas lift system will also have a packer located just above the casing and tubing perforations. The annular space is closed on bottom, so that gas injected into this area from the gas compressor located on the surface will cause the system to function.

B-2. Placing the Tubing and Valves in Order.

The gas lift valves will be a specified distance apart and a specified distance off bottom. Before the tubing string is hauled to the location, the pipe is usually rolled out on a rack and the joints measured and selected

to allow a specific length for each valve group.

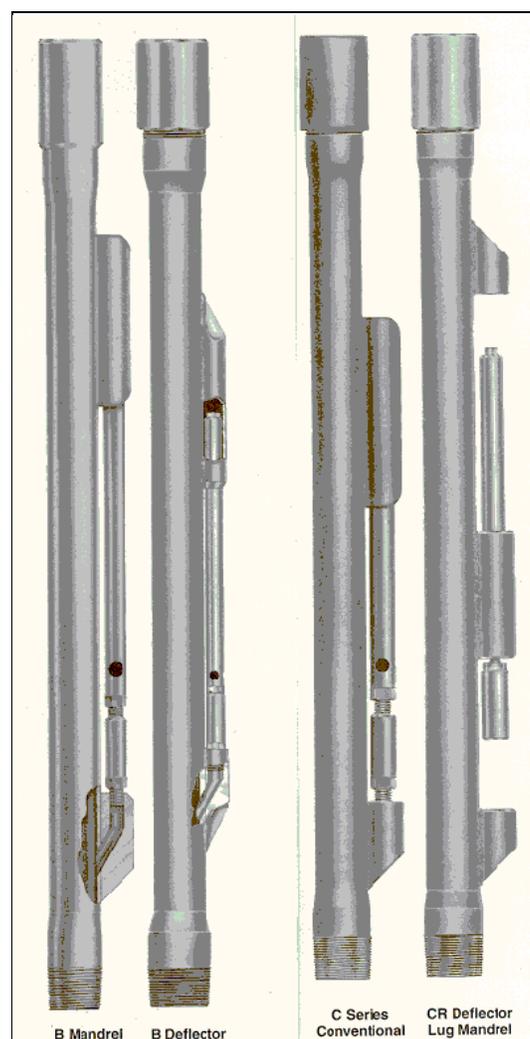


Figure 1. Examples of conventional gas lift mandrels.

(courtesy of Camco Products and Services Company)

When the selected pipe is loaded on the truck, a number 1 is written on each joint. A soft rope is laid across the loaded pipe to separate and identify it because this is the first pipe that will be run in the hole. The joints that are selected for the second valve group to be run are then separated. This pipe is loaded and a number 2 written on each joint.

The truck is progressively loaded with groups 3, 4, and so forth until the full string of tubing has been measured and selected. Every gas lift mandrel will also be identified as the valves are assembled and installed on the mandrel before it leaves the shop.

As this string of pipe and mandrels are run into the well, each joint is again measured and listed in the order that they are run. This group order is maintained every time that the tubing string is pulled and the valves serviced. This maintains the correct valve spacing to assure that the well will flow correctly after the service job has been completed, and that the correct valve is in the designated location. Each gas lift valve will be custom serviced for a particular well and must be run into the well in a specific order to obtain the desired service.

B-3. The Gas Lift Valve.

The gas lift valve must be set to open under a specified pressure. This may be automated by the use of a spring or, more often, a gas-operated bellows.

The upper chamber of the gas lift valve is an open chamber filled with a neutral gas under pressure. The fill valve is similar to a tire valve core and is set to a specified pressure, then sealed with a plug.

The lower section of the valve is a bellows with a round end that is pushed against a seat by the neutral gas pressure on the inside.

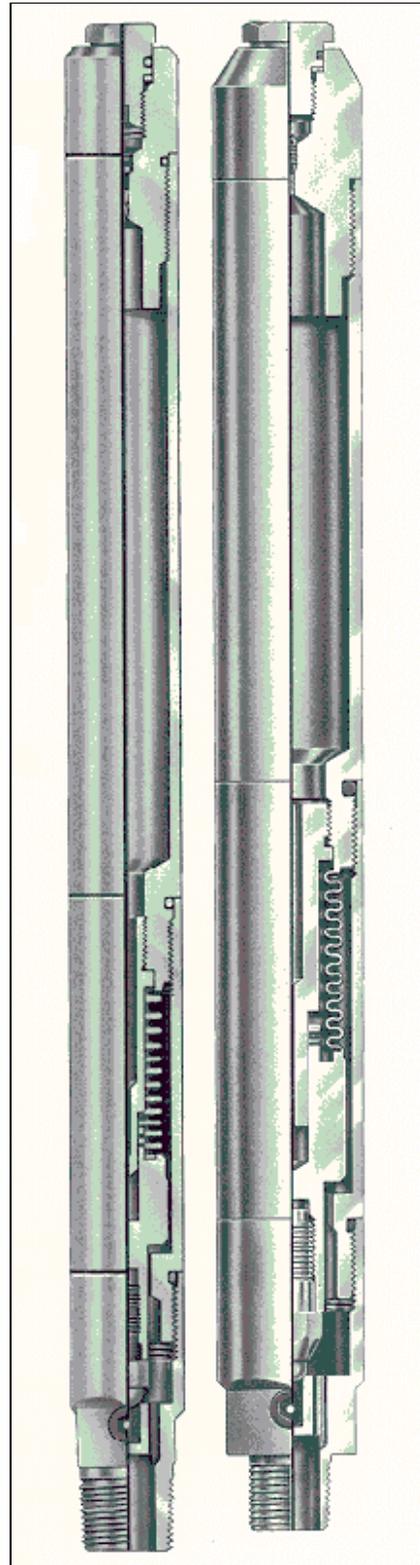


Figure 2. Examples of gas lift valves.
(courtesy of CAMCO)

This lower valve is exposed to the annulus pressure of the well. The casing pressure opens the valve to permit gas to enter the well to commingle with the fluid and make it lighter.

As the second valve opens and begins unloading the second section, the upper gas lift valve closes, and all of the lift gas enters the tubing through the lower valve. As the

third valve opens, the second valve closes, so that the only valve open is the third or lowest valve. This continues until the gas enters the tubing through the lowest valve, and all of the others above this valve are closed. The well will continue to remain in an unloaded condition as long as gas is being injected continuously.

