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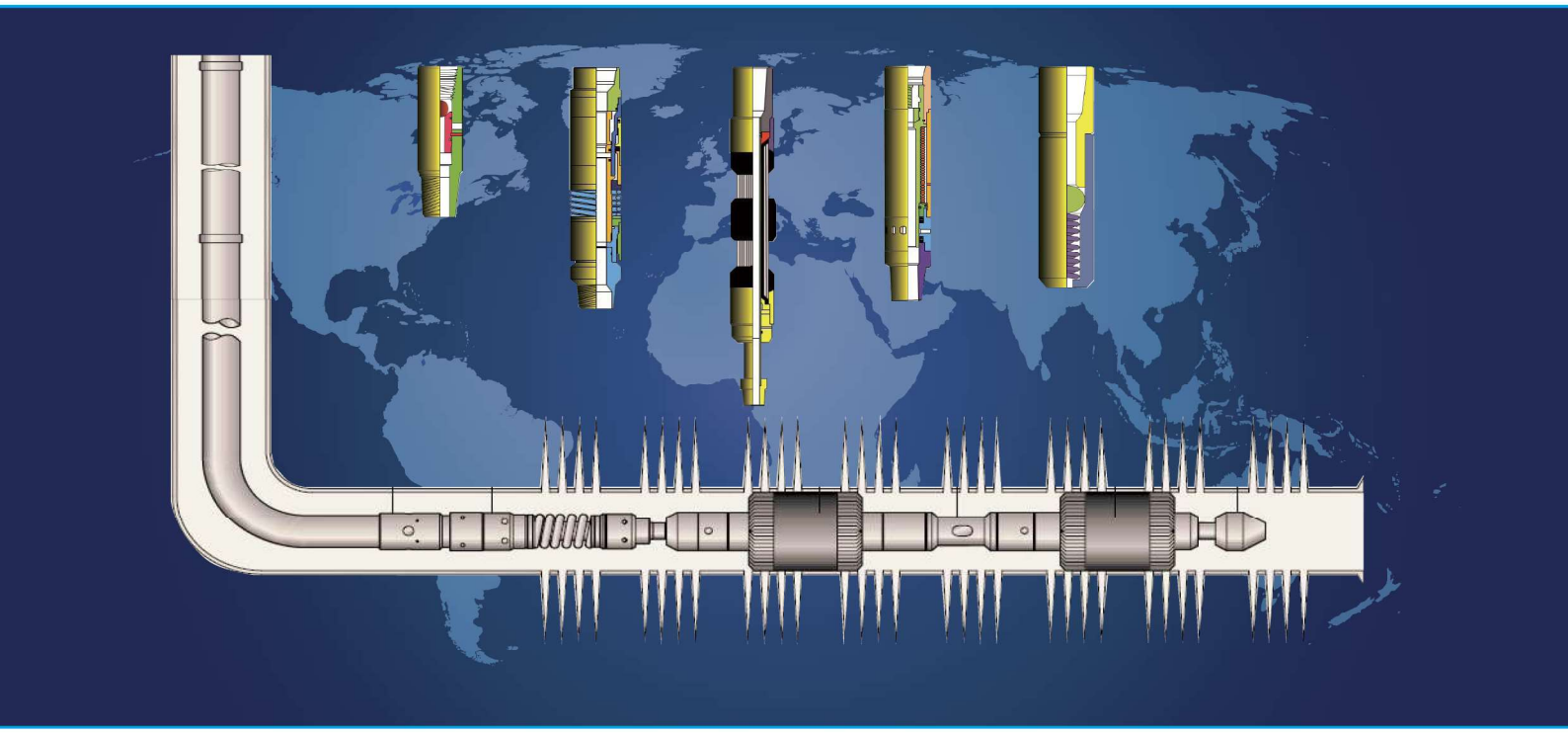
ASAP System for Acidizing



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1 Description:

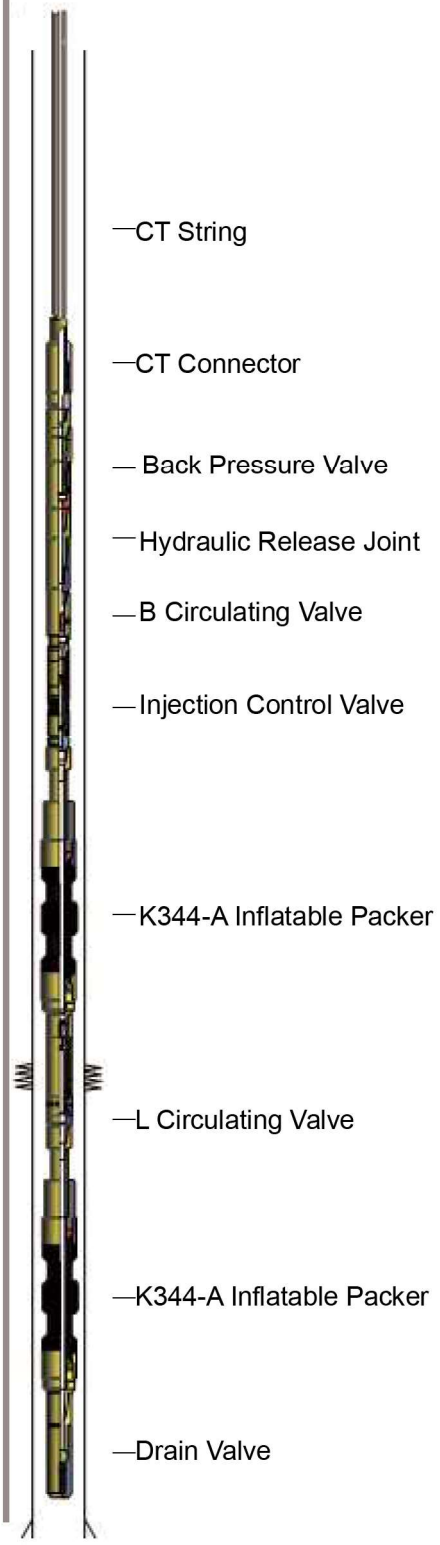
The Inflatable Straddle Acidizing Packer (ISAP) is a multiple set, injection tool string used for zonal isolation in cased and open hole. The ISAP is designed to run on tubing in both horizontal and vertical applications.
The system designed is basen on Acidizing technology all operating process. There are four valves and two packer in the system. They are :

- Model “B” Circulating Valve;
- Model “K344-A” Inflatable Packers ;
- Injection Control Valve;
- Model “L” Multi-Circulating Valve;
- Drain Valve.

The ISAP design allows the operator to precisely inject acid or chemical treatment into short sections of the formation. The ISAP is a modular system allowing it to be made up as it is being run into the well. The ISAP is controlled by a ball system, the first is to initiate the setting peration, the second operates a circulating port above the Injection Control Valve that once the treatment operation is complete opens a large circulation path through the tubing string while tripping out of the hole.

2 Features/Benefits:

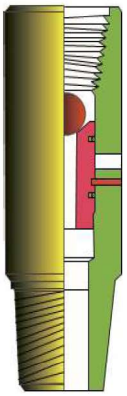
- Simple operation requiring no manipulation of the tool string to operate the tools.
- Packer inflation pressure is adjustment ant always higher than treatment pressure insuring a good seal;
- Modular construction allowing for ease of space out .
- Resettable allowing for the treatment of multiple zones in a single trip.
- The tools can be working in vertical, large diviated and horizontal wells.



3 Tools Construction

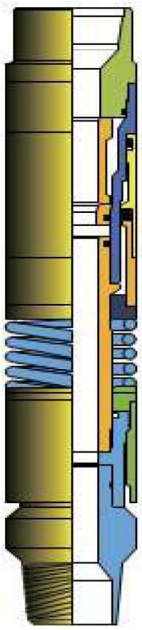
- Model “B” valve

  The B valve is a simple circulating sub. There is balance sleeve shear pin in body and O-rings seal the port of body to close the valve. A ball drop down and pump to shifting the sleeve down to “open” the valve and connecting with annulus.



- The Injection Control Valve (ICV)

  ICV is set above top packer. ICV have two functions, one is Circulating during the string running in hole and other function is close the circulating path and injecting to packer below.
  The prepad fluid is injecting by the ICV to top of the packer and drop a ball to close the circulating pathway and start inflating the both packers.



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K-344 Inflatable Packers

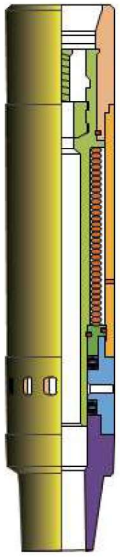
The K344-A inflatable packer is poppetless packer. There are five parts to assembly it which is top joint , Mandrel, element and float sub, bottom Sub. some of packer have a element pulling device for horizontal well.
As the packer have no any popet valve, inflating element to packing and deflatable to release.
The element start inflate pressure is about 100Psi and completion packing pressure is minimum at 1200Psi.
The element can inflate multiple , so the system can be acidizing for multilayers.
The element working pressure rate is base on OD of element and ID of casing or openhole.the table is following

Element O.D	ID of Casing or Openhole in. (mm)										
	2.441 in. 62 mm	3.068 in. 77.9 mm	3.548 in. 90.1 mm	4.090 in. 103.9 mm	4.560 in. 115.8 mm	5.012 in. 127.3 mm	6.049 in. 153.6 mm	6.538 in. 166.1 mm	7.025 in. 178.4 mm	8.097 in. 205.7 mm	9.001 in. 228.6 mm
2.28 in.	6500 psi 44.8 Mpa	6000 psi 41.3 Mpa	5500 psi 37.9 Mpa	4000 psi 27.6 Mpa	3100 psi 21.3 Mpa	2400 psi 16.6 Mpa	1500 psi 10.34 Mpa				
2.50 in.		6500 psi 44.8 Mpa	6000 psi 41.3 Mpa	5500 psi 37.9 Mpa	4000 psi 27.6 Mpa	3100 psi 21.3 Mpa	2400 psi 16.6 Mpa	1500 psi 10.34 Mpa			
2.63 in.		6500 psi 44.8 Mpa	6500 psi 44.8 Mpa	6000 psi 41.3 Mpa	5200 psi 35.9 Mpa	4400 psi 30.3 Mpa	3000 psi 20.7 Mpa	2400 psi 16.6 Mpa	2100 psi 14.5 Mpa		
2.75 in.		6500 psi 44.8 Mpa	6500 psi 44.8 Mpa	6500 psi 44.8 Mpa	6400 psi 44.1 Mpa	5200 psi 35.9 Mpa	3400 psi 23.4 Mpa	2700 psi 18.6 Mpa	2100 psi 14.5 Mpa		
3.00 in.			7700 psi 53.0 Mpa	6500 psi 44.8 Mpa	6000 psi 41.3 Mpa	5200 psi 35.9 Mpa	4400 psi 30.3 Mpa	2400 psi 16.6 Mpa	2100 psi 14.5 Mpa	1500 psi 10.34 Mpa	
3.38 in.			8500 psi 56.7 Mpa	7700 psi 53.0 Mpa	6500 psi 44.8 Mpa	6000 psi 41.3 Mpa	5200 psi 35.9 Mpa	4400 psi 30.3 Mpa	3000 psi 20.7 Mpa	2100 psi 14.5 Mpa	1500 psi 10.34 Mpa
3.75 in.				8500 psi 56.7 Mpa	7700 psi 53.0 Mpa	6500 psi 44.8 Mpa	5500 psi 37.9 Mpa	4400 psi 30.3 Mpa	4000 psi 27.6 Mpa	3400 psi 23.4 Mpa	2100 psi 14.5 Mpa
4.25 in.					8500 psi 56.7 Mpa	7700 psi 53.0 Mpa	6500 psi 44.8 Mpa	5500 psi 37.9 Mpa	4400 psi 30.3 Mpa	4000 psi 27.6 Mpa	3400 psi 23.4 Mpa
5.38 in.							7700 psi 53.0 Mpa	6500 psi 44.8 Mpa	5500 psi 37.9 Mpa	4400 psi 30.3 Mpa	4000 psi 27.6 Mpa

Model “L” Circulating Valve:

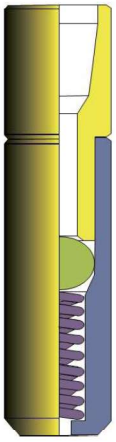
Model “L" multi-circulating valve is one of O’lun independently developed a downhole multiple on-off valve series. The valve actuated by internal hydraulic pressure in the string Only. When achieved inside and outside differential pressure is about minimum 7 Mpa, the slide sleeve shifting down to open, It can be normally circulating directly. In the ASAP application is acidizing. and under 7Mpa the both packer is inflating.

During acidizing, the valve is open keeping the flowing pressure during 2 Mpa to 70Mpa. The flow of the highest pressure can reach 70 Mpa. When the pump stop, and inside and outside differential pressure is balance, the spring action the sleeve up to close slowly. The valve can be switch for many times. The maximum working pressure is 50 Mpa.



Drain Valve:

The valve is a flow actuated valve. It is set at below of the bottom packer. It have two positions. One is working position with the valve is “close” plug the mandrel for packers inflating and injection. when inflating the packer, some liquid flow though the valve and ball will press the spring and close the valve. When the internal pressure reduce to “0’”, the spring will raise the ball leave the ball seat and deflating the packers, the valve will open to reduce the packer element pressure to zero to release the packers.

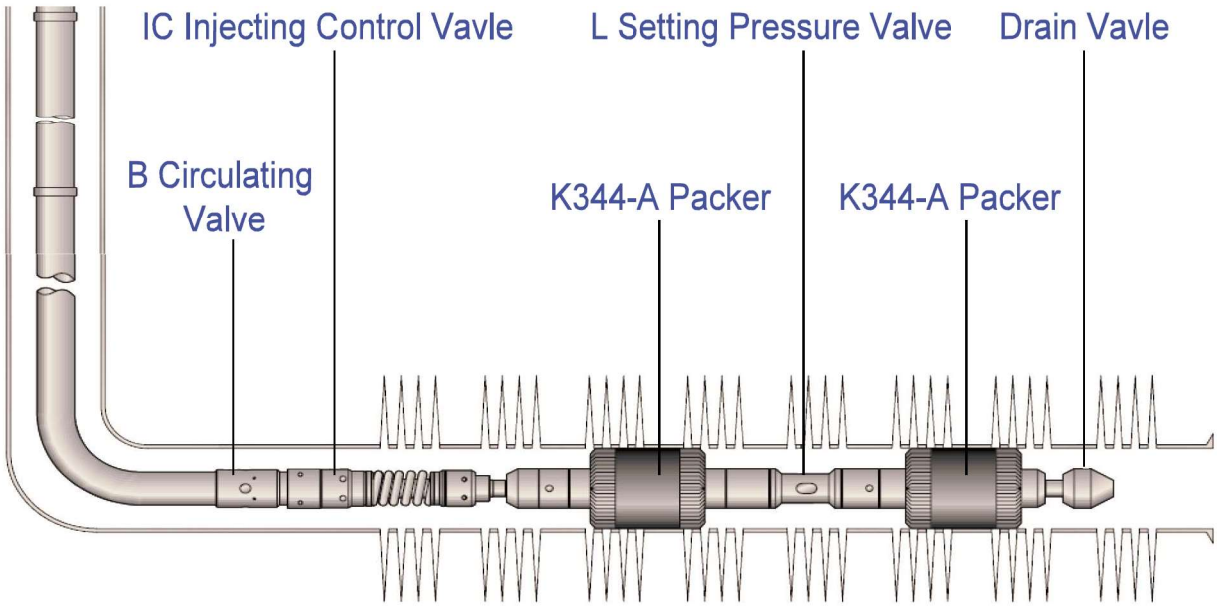


4 Working String

"Connector + Hydraulic Release Joint + Mechanical Release Joint + Mechnical Locator + B Circulating Vavle + Top Packer + L Circulating Valve + Bottom Packer + Plug"

5 Operating Procedure

- Assembly the all tools and RIH;
- Set in casing to check the system working well.
- Confirm the setting depth and prepare set the two packers;
- Displace the prepad fluid and drop to close the injection control valve.
- Pressure in Tubing to set the both packer;
- Pull up and slack down to confirm the packers are set;
- Keep pump to open the L valve;
- Asidizing;
- After be section worked, decrease pressure and waiting deflatable;
- Move to other place to repeat process above;
- When all section have been injected, drop a other ball to open the B valve to circulating;
- Decrease pressure and pick up to retrive the tools.



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