

## IS YOUR CONTROL SYSTEM OUT OF CONTROL?

By Ian Speer

What is in your compressor control system and how often should it be looked at? The following is a list of the items commonly found in compressor control systems.

Regulators	K
Inlet butterfly/Poppet Valve	I&T
Unloading System	
-Running Blowdown Valve/Anti Rumble Valve	K
-Shutdown Blowdown Valve	K
Thermostat Valve	T
Minimum Pressure Valve	I&T
Relief Valve	I&T
Oil Stop valve (if required)	T

*Legend*      *K = Kit*      *I = Inspect*      *T = Test*

All of these items are individually fairly simple; the drama begins when several of them start to misbehave at the same time.

The items marked "K" can all be fitted with service kits to return the component in question to its original performance. In the case of a rig, periodically re-kitting and adjusting ALL of these items will result in 1-2 years trouble free operation.

By law, the relief valve has to be tested annually by a competent person and fitted with an inspection tag. This is the only servicing required for this item.

The thermostat element/s should be removed and tested in either hot oil or hot water depending on their rating. Extreme care should be taken if a hot oil bath is being used, as serious burns and fire are a real hazard. The thermostat element will normally move or open 5-8 mm depending on type. Before testing, inspect the inside of the housing for wear marks or ridges which may prevent the element from opening correctly. This is normally a problem with machines over 10 years old with many hours of use.

To test the units, immerse them in a container with about a litre of compressor oil in it and stir the oil while it is being heated. If a thermometer is available, measure the oil temperature directly, otherwise paint a section of the outside of the container black and use a digital thermometer.

As thermostats age, they open progressively less, resulting in increasing operating temperatures on hot days. This is due to leakage of the wax inside the

thermostat which expands when it is heated to operate the thermostat.

**Minimum Pressure Valve (MPV).** To test this item, run the compressor up and switch to high pressure mode, then slowly open the main air valve and dump all the air in the receiver to atmosphere while watching the pressure gauge that is showing the system pressure inside the main receiver/separator vessel. Record the lowest pressure observed and then switch to low pressure mode and close the main air valve and check this against the maker's specification.

MPVs on two stage compressors are normally set between 135 and 180 psig. If the minimum pressure is low then separator damage will occur and the proper circulation of the oil in the compressor may be compromised.

Inlet Control System. This will consist of either a butterfly or a poppet valve and for the butterfly type, some sort of air ram or other actuator as well. For the poppet type, there will be a piston with a spring in a chamber which is actuated by a signal from a pressure regulator.

If you have 100 psig workshop air available, it is generally possible to remove the line from the regulator to the poppet/butterfly actuator (the compressor should NOT be running at the time) and feed a little compressed air into the system and observe its operation.

All moving parts should function smoothly without any sticking or binding. Linkages should not have loose ball joints or pivots.

Pay particular attention to the butterfly type valve as wear around the pivot area can create a path for dirt and dust to be sucked into the compressor. I have seen a trail of dirt down into the inlet of a failed compressor from this point. If all is well, refit the control linkages and hoses. Dismantling of poppets is a bigger job and not required as often (probably every 3-4 years).

In the case of actuators, such as the IR UL88 and Sullicon from Sullair, annual re-kitting for a unit doing more than 2000 hours per year is recommended and an inspection for lower hour units.

The compressor may have only one pressure regulator or as many as 4 in its control system. As regulators age they start to let a signal leak through before they reach their set pressure. This results in the compressor failing to deliver its rated volume at full pressure and will directly impact on drilling penetration rates.

At a minimum, the main or high pressure regulator should be re-kitted annually to maintain peak performance. I have tested a number of compressors and found some of them to be 15-20% or more down on volume and not making full pressure. On one occasion the owner thought that his booster was faulty and when the pressure regulator was serviced his problems were solved; the cheapest booster rebuild in history.

The running blowdown/anti rumble valve and shutdown blowdown valve were touched on in the article in the previous issue and these are easily checked while the compressor is in service. In any case the former does the most work and will benefit from annual inspection while the latter will generally run several years without problems.

Completing all the work discussed here will take 6-8 hours on a cool clean and accessible compressor with all the correct tools and parts available. See if you can cut a deal with your supplier for a kit of service parts and allow them a couple of months to deliver them to you in time for the next break in your work. This will avoid expensive freight and if you buy in spring it is the quiet time as fewer machines fail in the cool weather.

Plan a full day for the work and get rid of the problems for a year instead of having to deal with unexpected dramas at the least convenient times. After the work is completed, toss any failed items away and put any items that may have some life left in a bag and store in the glove box of the rig or rod truck for a rainy day.

Get a good fitter or mechanic to work with you and supervise you while you do the work. It will cost you the first time, however you can do it yourself the next time and of course if you do have a problem in the field you will be a lot better placed to fix it quickly. The cost of all the kits may be from \$1,500-3,500 however most compressors spend several days per year down with control system problems and often long periods operating at less than full efficiency at a far greater cost in lost time and production while getting mechanical people in to do the work.

No attempt has been made to explain how to set up the control system from scratch. Such an article would be very long and involved and specific to each type of compressor as it would have to address many safety issues hence the recommendation to seek assistance and training from a competent person.

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