Expandable Steel Patch FAQ
SIQ733-AB

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Job evaluation and feasibility

What are the common applications for the patches?
Mainly perforation shut-off (56%), casing repair (29%), frac port sealing (15%).

Advantage of expandable steel technology vs Cementing?
Success rate of cement jobs is not satisfying customers, and this remedial is known not to last a long time. Also cement does not withstand high pressure or pressure cycling, the patch can withstand very high pressures with no cycling limitation.
Cement needs to dry and to be drilled afterwards, the patch is usually set in 1 day and well is perforated/fracked/put back in production immediately after POOH.

What is the success ratio for Patch Operations and how do you measure it?
95%. The success ratio is determined from client feedback (on 1 - Job Preparation Efficiency / 2 - Personnel Performance & Safety / 3 - Job Result) and also from our internal job success criteria.

What are the main failures?
Nearly all the times a patch fails a pressure test, it is because it has been set in the wrong place.
A few patches did burst at high internal pressure when they were unsupported, in very specific applications.

How long does it take to resume my activity (production, fracking)?
Well can be put back in production/fracked immediately after the patch setting.

What is the maximum setting temperature?
The limitation for the setting is the Inflatable Packer working temperature, 150°C / 302°F for most models (slightly less for 4 1/2in: 140°C / 284°F)
What is the maximum working temperature (production) ?

Standard max patch working temperature is 150°C / 302°F. Other models are available for working temperature up to 250°C / 482°F. Please consult us.

What holds the patch in place ?

After expansion, rubber stripes are energized and keep residual pressure between the casing and the patch to hold it in place.

What is the ID of the Patch when set ?

This information is given in the specification sheets. It depends upon patch thickness and casing size.

What is the Patch maximum internal pressure?

It depends if the patch is supported or not. If supported, the value will be the same as the casing maximum internal pressure. If not supported, see the specification sheet.

What is the maximum patch length ?

12m (40ft) is a standard size, but we can manufacture patches at any length: the limitation will most of the time be the maximum possible rig-up length. Contact us for feasibility.

Are you able to run a mechanical packer through the patch?

It will depend on the patch set ID vs packer OD.
Job evaluation and feasibility

Could you run a patch through a set patch?
In most cases yes (sometimes nor possible for thick patches in heavyweight casings)

Can we perforate through a patch?
Yes.

Is it possible to overlap patches?
In most cases yes (sometimes not possible for thick patches in heavyweight casings)

Is it possible to set a patch in open hole?
Yes in vertical and shallow wells, usually to cure total losses.

Is it possible to set a patch in a multi-diameter casing?
Yes, it will mold to the casing whatever its geometry (to the extent that the maximum expansion ratio for the patch is not reached).

Can you set a patch in Frac ports or DV tools?
Yes, we have set many Patches in milled frac ports, cementors, etc, often prior to frac the well.
Can you set a patch to cover a longitudinal crack in the casing?
There is no problem if top and bottom of patch are expanded on proper casing with good integrity. The maximum patch internal pressure may be decreased because of the crack (consider that the patch is unsupported).

Ability to install patch in a gas well?
Yes, but liquid is needed to inflate the packer.
Fluid level: maximum 2400m TVD if no pressure in the well

Compatibility with chemical reagents?
Chemical reactions on stainless steel are complex and depend upon:
- pH
- Temperature
- Chemical components such as H2S, CO2, Cl-, ...
The 321 stainless steel is better than others in acid environment, but at high temperature there could be some limitations. Fill the 'Material Compatibility Form' and send it to us for detailed information.

What is the price made of?
- The patch
- The expansion charges (when the patch is expanded)
- The downhole and surface tools (rental)
- The personnel (one field engineer, one Field operator)
Plus taxes, transport, travel, and accommodations.

What should we rent, what do you provide?
We need you to provide:
- A rig and tubing / drill pipe with adequate pressure rating, and clean fluid to topfill it
- A drillstring/tubing safety valve (if required in your country)
- A high pressure (8000psi max, sometimes 5000psi) low volume (5gpm=20lpm) pumping unit with safety features (max pressure setting) & accurate recording is usually provided by Saltel Industries but in some circumstances we may use another pump (space limitation, offshore, etc...)
- A depth control technique for the positioning: a Gamma Ray/CCL log through the tubing/drill pipe is highly recommended
- If required for well control or to avoid wet pulling out, a circulating valve to be set on top of BHA
Well Preparation

What do I need to do to prepare the well?

- Run a Scraper to clean the wellbore and a drift to confirm casing ID
- A caliper log could help to better target our intervention
- For heavy oil areas, it is recommended to circulate fluid (hot fluid/solvent) just before the patch operation.

How long do you need to be ready to run?

If we have an Operations base in your country, for standard patch we can be ready to leave our shop with a couple of hours. For remote jobs contact us. For a customized patch the manufacturing and shipment can take some weeks.

How much rat-hole do you need below the zone to patch?

Bottom of the setting tool is the patch holder, at the bottom of the patch during RIH. During the expansion steps all the BHA is run through the patch, so patch holder goes down (while the patch is anchored). Roughly we need a minimum distance longer than the patch length below bottom of patch. Our setting process can be adapted if the cellar is not sufficient (setting done in two runs).

Operations

What should be the pressure rating of the tubing/DrillPipe?

It depends on the patch thickness and the casing OD. When determined, we will be able to give the max anticipated pressure for the operation.

Can we circulate through your setting tools?

No, although it is possible to put a circulating sub just above the BHA (it will need to be closed during the patch expansion)

How is the patch positioned?

We highly recommend G-Ray/CCL correlation for the positioning. In some cases (shallow depth) we can also position using pipe Tally or a Mechanical Casing Collar Locator. It is also possible to tag a plug then pull to target depth.
Troubleshooting

What can go wrong?
The tools are designed as simply as possible, so there’s not much which can go wrong. The Patch is expanded from the top down, so the expansion tool is never below an unexpanded part of the Patch, and in the event of a problem can it be retrieved and changed. There are a variety of safety features (weak points and fishing profiles, mechanical and pressure bleed-offs) which can be used in case of problem.
A generic risk analysis is available upon request (or a customized risk analysis can be done if requested).

Miscellaneous

How is the patch tested?
If there is no other leak than the zone to cover, the entire well can be pressure tested just after the patch expansion. If there is another set of perforations for example, run a packer to pressure test the patch locally.

What’s the delivery time for a patch with a customized OD?
Generally 8-10 weeks, + shipping time. Please consult us.