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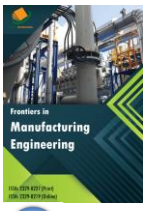

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RESEARCH AND APPLICATION OF DOUBLE OPENING TYPE OF PRESSURE SLEEVE

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ABSTRACT

In the fracturing process, the pressure sleeve opening pressure often unusual circumstances, After Analyzing structure and principles of common pressure sleeve, analyzing and summarizing its problems encountered in the Sulige block, a reliable pressure sleeve is proposed and its structure and principle are also presented in this paper. The application of the sleeve in two adjacent wells of Sulige has also been compared and its detail application in the field has been introduced.

KEYWORDS

Pressure sleeve, abnormal pressure opening, structure, principle.

1. INTRODUCTION

During exploration and development of the oil and gas fields, the technology of well completion and fracture has become a necessary measure to realize high production, especially in the tight oil and gas fields, the application of fracture technique has been an essential way of improving the recovery efficiency [1]. As for the staged fracture technology at home, the main fracture way is to use the packer and fracture with sleeve [2]. In application, the central risk is to open the pressure sleeve; if the sleeve can not be opened successfully, the later processes will be seriously influenced [3]. And the fracture fluid has been prepared. Based on the study, if the processing time is too long, the fluid nature will go bad and the economic loss will be serious [4].

In Sulige gas field, the pressure sleeve is often opened with high pressure or abnormal pressure. According to a research, when running in the completion stem, the pressure sleeve is required to be opened before running in the tie back stem to avoid unnecessary loss produced by fracture problem [5]. But the opening pressure still appears more highly, and a safe and reliable pressure sleeve is of great urgency [6].
In order to solve the above problems, this paper introduces a reliable sleeve, which has double opening ways with the advantages of high pressure prevention and convenient assemble and presents its in-site application.

2. DISADVANTAGE ANALYSIS OF COMMON PRESSURE SLEEVE

The following figure is an example of the commonly used pressure sleeve in market now. Its structure has been briefly analyzed and the disadvantages are pointed out. During tool running, an experienced engineer would always limit the running pressure with less than 20 tons when the tool is at the horizontal section. If the pressure is too high, the sleeve is very difficult to be opened. According to a scholar, because the fluid exit of the sleeve would be plugged by the impurities and the inner sleeve would also be plugged or, the inner sleeve and the outer body would be deformed and plugged [7-10].

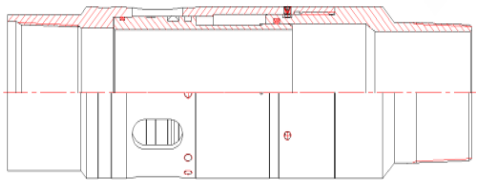

Figure 1: Brief drawing of structure of common pressure sleeve.

3. BRIEF INTRODUCTION OF THE RELIABLE PRESSURE SLEEVE

3.1 Structure

As showing in Figure 2, the reliable pressure sleeve is made up of crossover joint, outer sleevebody, outer sleeve, retaining spring, inner sleeve body, inner sleeve, gear-backing ring, and the lower joint. This sleeve can be opened by two ways. The upper part can be opened by outer sleeve with port A exposed and the lower part can be opened by inner sleeve with port B exposed.

The two kinds of opening ways can effectively prevent plugging the sleeve produced by high running pressure. sleeve can be realized by port A or in the stem; after the pressure reaches the given value, shear pin 9, the outer sleeve 6 goes up, and the check spring 7 limits the position of the outer sleeve to prevent to close port A; at the same time, shear the pin 13, the inner sleeve goes down, and the gear backing ring 16 limits the position of the outer sleeve to prevent to close port B. Port A or B opens to establish the outer and inner connection to realize the first fracture. Based on a research, opening of this equipment is reliable to avoid the abnormal opening because of too high running pressure or mud and sand at well bottom [11].

3.2 Principles

The fluid goes into the hydraulic cylinder of the outer sleeve from port A to oppress the pressure; Oppress the pressure on the inner sleeve by the fluid in stem;Oppress the pressure to 35MPa-38MPa, shear the pin 9 or pin 13;Up going the outer sleeve and lowering the inner sleeve, open port A or B to establish the connection [12].

4. FEATURES

(1) Have two opening ways with outer sleeve 6 and inner sleeve of 12

The principle: after running the tools, the oppressed pressure of the outer sleeve and inner sleeve can be realized by port A or in the stem; after the pressure reaches the given value, shear pin 9 , the outer sleeve 6 goes up, and the check spring 7 limits the position of the outer sleeve to prevent to close port A; at the same time, shear the pin 13, the inner sleeve goes down, and the gear backing ring 16 limits the position of the outer sleeve to prevent to close port B. Port A or B opens to establish the outer and

inner connection to realize the first fracture. Based on a study, opening of this equipment is reliable to avoid the abnormal opening because of too high running pressure or mud and sand at well bottom.

(2) It can be equipped simply

There are outer sleeve body 4 and inner sleeve body 10, which can be equipped easily to avoid the assemble quality problems.

5. FIELD APPLICATION

Well Zhao 51-25-6H2 and Zhao 51-31-8H1 are both developed wells in Zhao 51 block of the east area of Sulige gas field. They have similar position and similar casing program. In well Zhao 51-25-6H2, the abnormal opening of the pressure sleeve appeared, and the reliable pressure sleeve was used in 51-31- 8H1.

On Sep.9, well Zhao 51-25-6H2 began to be drilled. The wall scraper was lowered at the hanger position and worked for 3 times and met no plugging; the well drifting was realized by running in the single simulated milling stem and double simulated milling stem ;and no plugging.

On Sep.15, finished the tie-back stem running, the pressure testing was qualified, changed the well head, ran down the pressure sleeve with the designed pressure of 35MPa and the real pressure of 40MPa, no reaction. When the pressure reached 45MPa , no reaction, and 48MPa, still no reaction. Released the pressure and pushed pressure again. Tied to shear under fatigue condition, pushed the pressure of 50MPa again and again, and stabilized the pressure for 20 minutes. Opened the sleeve for the third time and the pressure dropped to 20MPa.

On Sep. 20, began to drill well Zhao 51-31-8H1. Ran down the wall scraper to the hanger to scrape repeatedly for 3 times and no plugging; well drifting was realized by running in the single simulated milling stem and double simulated milling stem; and no plugging [13-15].

On Oct. 5, ran down the pressure sleeve, when the pressure reached 38MPa, the sleeve was opened only in one time. Two wells through wells similar situation, similar to the lower tube into the case, sleeve open abnormal, mostly under the column Pops, under the pressure of tonnage is too large, so that the accumulation of too much pressure sleeve impurities or micro-deformation occurred, reliable pressure sleeve, internal and external use to open in two ways, but also from the structure is a two-body structure, so avoid these situations, the successful open [16].

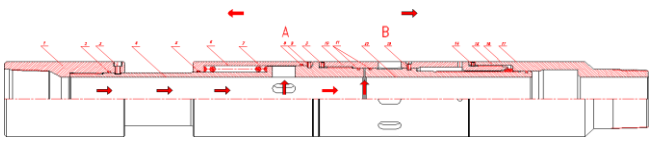

Figure 2: Brief structure drawing of common packer.

1–crossover sub ; 2–sealing ring1 ; 3–screw pin1 ; 4–outer sleeve body ; 5–sealing ring 2 ; 6–outer sleeve ; 7–check spring ; 8–sealing ring 3 ; 9–shearing pin ; 10–inner sleeve body ; 11–sealing ring4 ; 12–inner sleeve ; 13–shearing pin ; 14–screw pin 2 ; 15–lower connector ; 16–gear backing ring ; 17–sealing ring 5

6. CONCLUSION

The study concluded that double to open the way to better adapt to the situation underground, two-body structure can effectively avoid the deformation caused by micro-opening pressure abnormalities. From the use of point of view, in the field and reliable pressure sleeve to avoid sleeve can not be opened because the pressure brought by the passive situation.

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