High Strength Composite Tubulars

Handling and Installation Guide

HSCT running

Almost daily we receive requests from operators asking us if their wells and well designs are suitable for High Strength Composite Tubulars (HSCT). In those communications, the issue of running the casing and possible mitigations to allow safe casing running under a given set of circumstances is always a point of interest. In this document, we will explain the general differences between conventional casing running and the running of HSCT.

Topics:

Content

Transportation

HSCT are supplied in 40 ft. closed containers or on a flat rack container. All tubular bundles are packed and crated with 3 to 6 layers depending on the casing diameter. It is advisable to not unload the composite tubulars during shipment. Unload at place of destination for operation. On arrival the load should be inspected:

- Check quantities, report deviations and check for shipment shiftings.
- Visual check for excessive bending caused by overtightening of straps, for thread / adhesive connection damage and/or for impact damage.
- Quarantine or mark tubulars which are damaged. Do not install damaged products. Contact your Akiet representative.
- Receiving party is responsible to note transporting damage and contacting carrier. Make pictures of any suspected load conditions or damage.

Storage

Composite tubulars will be equipped with protectors during storage and movement. Akiet suggests the protectors not be removed until just prior to makeup on the rig floor. If possible it is advised to store the tubulars in the transportation container to minimize handling and risk of damage.

Handling

For the majority of jobs, the casing will be lifted to the drill floor by a crane. In this case, the joints can be lifted directly from the crate without being placed on the joint rack first. There is an ongoing development of suitable protectors and lifting clamps for HSCT to allow pulling the casing through the V-door via a pick-up machine to the rig floor. Until these are available handling by crane is required. The shipping container arrives on site it should be placed near the pipe rack. Care should be exercised when unloading crates out of container and breaking bundles to avoid personal injury and tubular damage. The crane should be placed where it can can reach the drill floor. The individual joint must be drifted in the crate and lifted from the crate using a two leg sling. The joint ends must be guided by a worker using a rope to prevent the joint from rotating while hoisting. In this manner, the box end can be directed to the floor where it can be hooked up the elevator.

Installation

Standard oilfield casing running techniques are used to install composite tubulars. During the installation, an Akiet installation engineer should be on site for the supervision or the purpose of training the installation crew, until such time that the installation crew is fully trained so as to not need the Akiet supervision any more (like when the crew has experience fro previous wells with Akiet HSCT). HSCT are run using conventional slips, elevators, stabbing guides and fill-up tools. Special adhesive installation equipment is provided by Akiet.

Elevator Selection

Depending on the well design and running conditions, our engineers will either choose a flush or a collared type connection. When a collared connection is used, a standard elevator can attach under the upset of the box. In most cases the elevator must be equipped with soft elements that match the joint and collar dimensions. Special considerations may be required when flush tubulars are used. Flush connections require the fitting of a purpose designed safety lifting clamp to lift the flush joint to the

rig floor. On the casing running bails is a correct YC slip type side door elevator installed. On the floor is a spider or slip type elevator placed. The slips must be equipped with the correct dies at the drill floor and the flush string must be extra secured with a specific designed safety clamp. Ensure that slips of slip type elevators are of the correct size to accommodate the size, weight and length of the joint or string. Ensure that the safety clamp is the correct size and in serviceable condition. When the elevator pulls the joint into the mast, care must be taken that a gradual transfer of the load takes place between crane and elevator. Bumping of the HSCT must be prevented. Just like with any other specialty casing, handle with care.

Slip selection

When a collared type connection is used, standard slips and dog collars can be used. Over-tightening of a dog collar must be prevented. With higher string weight the slips must be fitted with special dies that are better suited for gripping composites. Some applications will require not only special dies, but also the use of a purpose built safety clamp for additional safety. Otherwise, slip operation and handling is the same as in conventional casing running. The use of automated hydraulic slips and rotary tables is possible but the exact operating conditions and pressure settings must be determined by Akiet, and is part of the well design and running plan respectively.

Stabbing

HSCT can be supplied with a premium metal connection or with a special adhesive bonded connection. The premium connections are made much the same way as a standard threaded connection on a metal joint. For making the adhesive connection, pin and box protectors must be removed and a stabbing guide must be placed. Prior to stabbing the casing crew will visually check and clean the pin and box with a proprietary cleaning agent after which the joint can be stabbed. A stabbing board is required to offer stability for ease of alignment. After removal of the stabbing guide, a visual check on the stabbing depth is done to ensure proper concentricity between pin and box and proper sealing of the injection chamber.

Connecting

The connection is made by injecting adhesive into the connection through an injection port, while the air is vented through a vent hole. When the injection is complete, the glue will set and the correct number of minutes must be allowed for the adhesive to set to a point where the string can be safely lifted. The waiting time is determined by the string weight and the temperature of the environment. It can vary from 5 to 10 minutes for extreme cases

Composite to steel crossover

Depending on the application HSCT can be interated with steel joints and appliances using cross-overs.. The layout can be steel-to-composite, composite-to-steel or steel-composite-steel. Any type of thread that is required for your specific application can be sourced. Due to the difference in expansion of composites compared to steel, a composites pin should be inserted into a steel box. Specific crossover designs depend on the casing weight in the application. The load requirements apply to the interface of steel to composite as to the pipe body. To allow fast running of the casing the connection from composite to steel pupjoints are pre-made-up and fit within a 40ft. container and can be handled by a rig that install R3 tubular.

Running

Take load with the elevator, remove safety clamp and remove the slips when the joint moves up. Run the string in hole preventing any shock loads. Excersice caution when lowering couplings through slips and Well Control Equipment. Run in until the collar is approximately 1m height above rotary table. Suspend the string in the slips and fasten safety clamp. Unlatch elevator and very carefully lift it over the collar or joint end. Just as with any other casing running operation, a maximum running speed will be determined by Akiet. In most cases, the running speed will be much the same as with other casing types. Monitor weight indicator to quarantee free movement. Ensure that tensile and compression ratings are not exceeded.

Filling up

When using a metal premium connection to join the HSCT , there are no special requirements for filling up and standard circulation subs can be used. When using the adhesive-bonded connections, extra precautions are needed to prevent pollution of the bonding surfaces. When using oil based mud, filling up must be avoided or minimized. The fill level must be monitored and remain at least 40 ft under the table. An extended fill-up tool with drip protection must be used. A special designed circulations sub (which is a crossover to the Top Drive System – TDS) is required.

Landing in Wellhead

At target depth (TD) set down the casing gently and avoid abrupt stops which can result in high tensile loads. Spacing out and landing the string properly is important. Well design and conditions will dictate how much landing tension is required.

All standard wellhead configurations can be used and with wellhead suppliers a system compatible to composite tubulars will be developed.

Landing in the wellhead is generally done on standard steel but may be done on HSCT connected landing joint as well. HSCT must be installed in tension and tension can only be applied to the string with standard steel or HSCT landing subs.

Well Control Equipment

Recommended practice is to close Well Control Equipment (WCE) on temporary steel rather than fiberglass. Laboratory tests of another Fiberglass Tubular supplier (NOV) have shown that BOPs will close successfully on composite tubulars but could damage the joint and it needs to be replaced.

When applied on composite tubulars, use lowest possible pressure for rams when setting on composite. Close rams only on pipe body. Annular type BOPs are recommended and will not damage composite tubulars.

A real field test with composite and pipe rams, shear rams and annular BOPs will be executed in the near future.

Cementing

Use conventional and standard steel float equipment and thread lock the shoe track as standard practice. A pre-made-up crossover from the steel shoe track to composite is preffered.

Composite centralizers are preferred with properly size centralizers for casign OD and bore hole ID.

Ensure not to exceed the internal and external pressure or tensile and compression ratings during cementing operation. Cementing in two stages may help avoid exceeding collapse rating and then this will be specified in the running procedure. The composite casing may require fixation or extra load during cementing. The fixation should not be fixated to the wall of the composite but to the landing sub. Avoid shock pressures when seating wiper plug. As the plug approaches the seating depth of the tubular the flow rate should be reduced to prevent exceeding maximum internal casing pressure rating upon contact with the float collar.

Pressure Testing

Recommendation is the placement of nipple profile above the packer. Always drop a standing valve to the nipple profile and test the tubular internally prior to pulling the string if the tubing is suspected of leaking. Do not rely on annulus tests to qualify a leak in tubing.

External and internal testing should be based on the end-user or licensing authority requirements. Ensure that exercised internal and external pressure tests do not exceed product design limitations.

Drilling out Cement

Allow cement to reach its full compressive strength prior to drill out cement. A rock bit is recommended with ¼" under gauge of the casing drift size. Do not exceed 1-2ton (2-4Klbs) weight on bit. Equip the drill out BHA with a centralizing joint, spiral drill collars, near the size of the casing drift diameter, but do not use near bit stabilizers (NBS). NBS creates a pivot point wherein the bending drill collars force the NSB to the low side of the hole and creates lateral force which damages casing on the low side. Reduce drilling rates for deviated wells, to monitor progress. Do not exceed 3-4 degrees deviation per 30m (100feet). Before drill out wells with deviations in excess of 5 degrees per 30m (100ft), please contact Akiet.

Learn more about HSCT

For questions or further installation details please contact:

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