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Turbulator

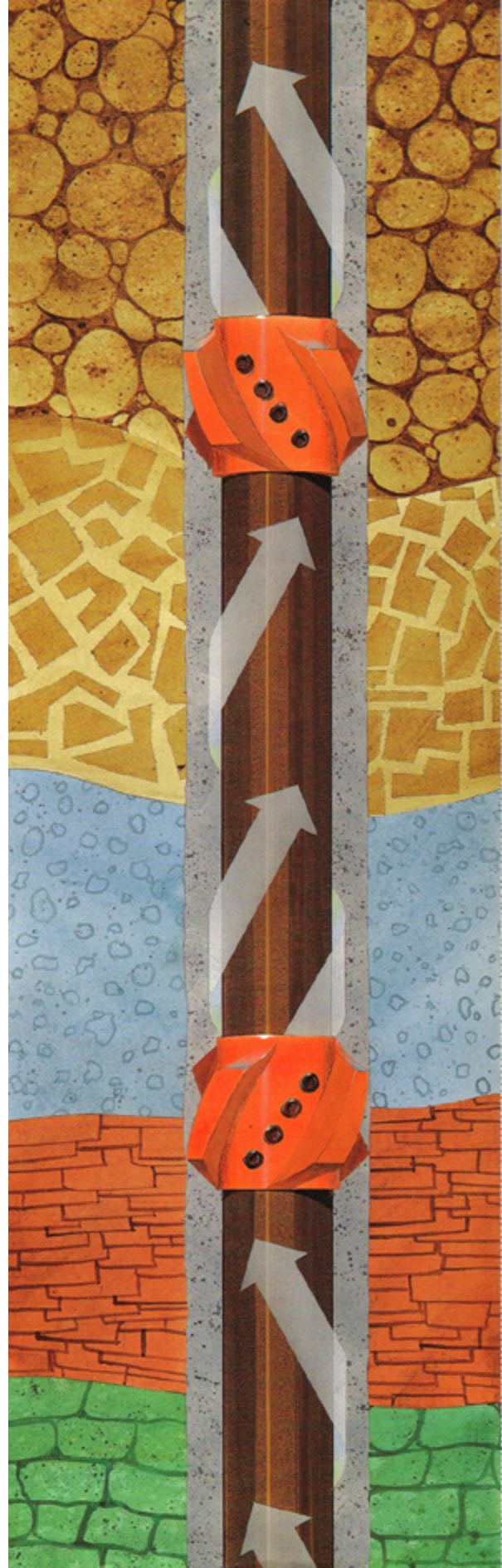


The Turbulator is designed and built to help operators achieve the primary cement job, necessary to isolate the zones of interest, and to obtain a cement seal in the overlap of liner installation. Turbulators are also effective when run above D.V. tools where it is not possible to reciprocate.

The turbulator is a sleeve made of mild steel pipe with wings angled at 40% to 50%, designed to accommodate most casing and bore sizes. The turbulators are attached to the casing, or on liners with set screws for stability.

Turbulators will:

- Maintain centralization creating a positive stand off
- Increase the cleaning action of mud-wash pumped ahead of cement
- Force jelled mud out of the hole
- Reduce the torque needed to turn rotating liners and pipe
- Reduce the chance of cementing stringers up the hole by displacing a full column of mud and thus preventing costly squeeze and fishing jobs
- Put cement slurry in a spiral turbulence around the pipe to insure a uniform bond for fifteen to twenty feet above each turbulator



Each turbulator places the cement slurry in a spiral action for fifteen to twenty feet. When placed two per joint from shoe joint to three joints above the zone of interest, plus two on every other joint in the overlap, a good cement bond can be obtained.

Shop tests show that turbulators will carry spiral action farther than 15' to 20', but in actual downhole conditions, at 15' to 20' above the last turbulator, the casing will be laying over against the borehole wall, thus effectively stopping the spiral action of the flow.



With set screws and threadlock material applied under the turbulator, it will withstand 120,000 to 190,000 lbs. of axial force without movement or slipping!



The turbulator represents a major revolution in achieving increased cementing success. The cost of turbulators to attain a primary cement job the first time is much less than the remedial work to repair a failure, not to mention the delay and loss of production. When tested on the same job in conjunction with centralizers, stand-off subs and bands, turbulators proved to be the only effective device. Bond logs clearly show quality bonds where turbulators were used in the quantity recommended and little or no bond at all where there are no turbulators.

Bond logs, in most all geographical areas, are available for inspection covering jobs run on liners and long strings.

Shop tests on a hydraulic press using a 7 1/2" piston, show that the turbulator installed with set screws only, withstands between 35,000 and 55,000 lbs. With threadlock material applied under the turbulator, it withstands up to 190,000 lbs of axial force

