ENHANCED SINGLE-TRIP MULTIZONE (ESTMZ™) SYSTEM

Save time and cost while improving reservoir producibility
ESTMZ™ Enhanced Single-Trip Multizone System
Franck pack multiple zones in fewer trips with complete isolation

The service tool assembly is rated at a cumulative volume of 2,000,000 lbs. The proppant pump was tested to determine the maximum pump volume at a predetermined rate that can be safely pumped through the service tool.

The service tool assembly is rated at a maximum of 45 bbls/min or 750,000 lbs per zone for a maximum of five zones. This is based upon following a recommended Halliburton ramp schedule. For other ramp schedules, the cumulative tool rating is 2,750,000 lbs of CARBOHSP proppant or 500,000 lbs per zone for a maximum of five zones pumped at a rate of 45 bbls/min. 

The ESTMZ™ System Packers
Several Halliburton packers play a pivotal role in a successful ESTMZ™ completion. Beginning with the industry-standard Perma-Series® wireline-set permanent packer, start the completion off with a 10,000 psi differential rating pack with an X-Trieve™ hydraulic-set retrievable packer. Either of these reliance packers can be combined with the Pack-Target™ to create a reliable, self-energizing packer. All packer combinations are rated 16,000 psi and have slips that are set, set, the energized regardless of internal pressure.

<table>
<thead>
<tr>
<th>PPG</th>
<th>16/30 CARBOHSP® Stage Propped Rate (bbls/min)</th>
<th>Total Propped Rate (bbls/min)</th>
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Test Results - 45 BPM

<table>
<thead>
<tr>
<th>45 BPM PPG</th>
<th>Optimum Crossover Design</th>
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<tbody>
<tr>
<td>1</td>
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Total at Idle, 22 BPM

<table>
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<th>45 BPM PPG</th>
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CABROHSP® is a registered trademark of Carbo Ceramics.
ESTMZ™ Enhanced Single-Trip Multizone System

Frac pack multiple zones in fewer trips with complete formation isolation

The providers of sand control equipment have been continuously challenged by the industry to develop more innovative completion systems in order to enhance reservoir producibility. Halliburton’s ESTMZ™ Enhanced Single-Trip Multizone system addresses the challenge with its latest generation of cable single-trip sand control completion technology.

The ESTMZ system is based upon Halliburton’s very successful STMZ Single-Trip Multizone system, which was first deployed in the early 90s and has since been installed in hundreds of wells. The ESTMZ system offers additional features, particularly for today’s demanding downhole environments. The system helps reduce overall completion cost and is designed to maximize well productivity by reducing the number of rig days required to complete a full job. While multizone completions allow long reservoir intervals to be separated for optimum fracturing design, and provides access to smaller reservoir intervals that would normally be bypassed, the overall number of workstring trips which can be reduced by deploying ESTMZ Multizone system.

This allows long reservoir intervals to be separated for optimum fracturing design, and provides access to smaller reservoir intervals that would normally be bypassed. It takes a single workstring trip to deploy. This reduces the number of workstring trips which helps lower overall completion costs.

To meet the actual customer requirements, five intervals were stimulated with a pre-pump volume per interval of 600,000 lbs of 16/30 CARBOHSP® proppant at a cumulative volume of 2,000,000 lbs. The proppant pump rate was 45 bbls/min. The second qualification test determined the ratings for the service tool and frac pack assembly.

The service tool assembly is rated at a cumulative 5,750,000 lbs of CARBOHSP® proppant pumped at a rate of 45 bbls/min or 750,000 lbs per zone for a maximum of five zones. This is based upon following a recommended Halliburton ramp schedule. For other ramp schedules, the cumulative tool rating is 2,750,000 lbs of CARBOHSP® proppant or 500,000 lbs per zone for a maximum of five zones pumped at a rate of 45 bbls/min.

Free cetane rating was determined for the first ramp stage and the second quality test cycle.

Pretreatment formation isolation with formation access to each interval provided by the frac circulation sleeve and optional PosiGuard® zonal isolation pack technology. Pre-and post-treatment formation isolation increases the operating envelope for deeper wells and is designed to maximize well productivity by reducing the number of rig days required to complete a full job. While multizone completions allow long reservoir intervals to be separated for optimum fracturing design, and provides access to smaller reservoir intervals that would normally be bypassed. It takes a single workstring trip to deploy. This reduces the number of workstring trips which helps lower overall completion costs.

Free cetane rating was determined for the first ramp stage and the second quality test cycle.

PERMA-SERIES® wireline-set permanent packer. Next in the ESTMZ system completion, beginning with the industry-standard PetroGuard® zonal isolation pack technology, is the Versa-Trieve® wireline-set permanent pack technology. ESTMZ™ hydraulic-set retrievable packer.

Open to new ideas, new opportunities, new challenges.

For more information, contact your local Halliburton representative or e-mail sandcontrol@halliburton.com.

www.halliburton.com

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ESTMZ™ Enhanced Single-Trip Multizone System

The providers of sand control equipment have been continuously challenged by the industry to develop new and innovative completion systems to enable the completion of increasingly deeper, more difficult wells in a cost-effective way. Halliburton’s ESTMZ™ Enhanced Single-Trip Multizone system addresses these challenges with its latest generation of cable single-trip sand control completion technology.

The ESTMZ™ system is based upon Halliburton’s very successful ESTMZ™ Single-Trip Multizone system which was first deployed in the early 90’s and has since been installed in hundreds of wells. The ESTMZ™ system offers additional features, for today’s demanding deepwater environments. The system helps reduce overall completion cost and is designed to maximize well productivity for today’s demanding deepwater environments.

ESTMZ™ Frac System Qualification Testing

Frac qualification testing was conducted to rate the ESTMZ™ system for pump rate and proppant volume. The testing was designed to accomplish two goals – the first was to meet initial customer specifications for a planned deepwater installation, the second was to determine the maximum proppant volume at a predetermined rate that can be safely pumped through the service tool.

The test was representative of a typical ramped frac treatment involving an outer test fixture representing 9-3/4 in. casing, a sand control upper extension, closing sleeve, and frac service tool. The test set-up simulates downhole conditions and validates the tool’s ability to withstand erosive wear.

To meet the initial customer requirements, five intervals were simulated with a proppant volume per interval of 600,000 lbs of 16/30 CARBOHSP® proppant with a cumulative volume of 3,000,000 lbs. The proppant pump rate was 45 bbls/min. The second qualification test determined the ratings for the service tool and frac pack assembly.

The service tool assembly is rated as a cumulative 3,750,000 lbs of CARBOHSP® proppant pumped at a rate of 45 bbls/min or 750,000 lbs per zone for a maximum of five zones. This is based upon following a recommended Halliburton ramp schedule. For other ramp schedules, the cumulative tool rating is 2,750,000 lbs of CARBOHSP® proppant or 550,000 lbs per zone for a maximum of five zones pumped at a rate of 45 bbls/min.
Proven Systems for Sand Control

HALLIBURTON

Proven weight-down positioning with the ShurMAC™ collet

Field-proven Versa-Trieve® packers and innovative high-load HPT setting tool

Selective shifting profiles

Multiple isolation packer options

Proven sump packers and top-snap collet positioning
**ESTMZ™ Enhanced Single-Trip Multizone System**

The ESTMZ™ Enhanced Single-Trip Multizone System addresses the challenge of completing a frac pack multizone completion in fewer trips with complete formation isolation.

### ESTMZ™ Frac System Qualification Testing

Frac qualification testing was conducted to rate the ESTMZ™ System for pump rate and proppant volume. The testing was designed to accomplish two goals: the first was to meet minimum customer specifications for a planned deepwater installation, the second was to determine the maximum proppant volume at a predetermined rate that can be safely pumped through the service tool.

The test was representative of a typical ramped frac treatment involving an outer test fixture representing 9 5/8-in. casing, a sand control upper extension, closing sleeve, and frac service tool. The test set-up simulates downhole conditions and validates the tool’s ability to withstand erosive wear.

To meet the initial customer requirements, five intervals were simulated with a proppant volume per interval of 46,608 lbs of 16/30 CARBOHSP® proppant pumped at a cumulative volume of 2,000,000 lbs. The proppant pump rate was 45 bbls/min. The second qualification test determined the ratings for the service tool and frac pack assembly.

The service tool assembly is rated as a cumulative 4,750,000 lbs of CARBOHSP® proppant pumped at a rate of 45 bbls/min or 750,000 lbs per zone for a maximum of five zones. This is based upon following a recommended Halliburton ramp schedule. For other ramp schedules, the cumulative tool rating is 3,750,000 lbs of CARBOHSP® proppant or 560,000 lbs per zone for a maximum of five zones pumped at a rate of 45 bbls/min.

### Ramped Proppant Schedule - Per Zone

<table>
<thead>
<tr>
<th>RPM</th>
<th>16/30 CARBOHSP® Stage Proppant (lbm)</th>
<th>Total Proppant Per Zone (lbm)</th>
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**Test Results - 45 BPM**

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<th>RPM</th>
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<th>Cumulative Total</th>
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**Note:** These ratings were validated at the end of each ramp stage. This cumulative rate design allows for next ramp stage to 22 bbls/min.

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