Sideport Nozzles
Cross Flow Action Increases ROP

**BENEFITS**
- Improves flow and cleans larger area of dome to help prevent bit balling
- No spearpoint erosion which may result when Center Jet nozzles are used
- Increased ROP as well as with soft formation tungsten carbide insert bits
- May be used in smaller bit sizes where Center Jet nozzles are not available
- Offers the advantage of a mini-extended nozzle with more impact force on the bottomhole

**COMPARISON TO CENTER JETS**
Conventional Center Jet nozzles produce only a narrow stream of fluid downward, not sideways, which is directed straight at the spearpoint of the bit causing a dulling effect over time. When using Sideport nozzles, no additional machining and welding are needed as with Center Jets.

**LABORATORY TESTING**
Computational Fluid Dynamic (CFD) testing of the Sideport nozzle has been ongoing at a major U.S. University. This testing allows Halliburton to maximize the efficiency of the nozzle and research additional improvements.

**GUIDELINES**
During severe balling, a Center Jet nozzle can be used in conjunction with the Sideport nozzles. In such cases, initial testing indicates that high ROP (80 ft/hr) requires three Sideport nozzles while slower ROP is enhanced by using two Sideport nozzles and one standard nozzle, thereby, increasing hydraulic horsepower per square inch (HHPSI) at the bottomhole for harder formations.

**CALCULATING TFA**
Calculate the desired TFA as if you are using standard nozzles. Choose a combination of Sideport nozzles with an equivalent TFA. Each orifice should be added as if it were a separate nozzle.

**EXAMPLE**

<table>
<thead>
<tr>
<th>Example</th>
<th>QTY</th>
<th>Size</th>
<th>TFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit #1</td>
<td>3</td>
<td>12/32”</td>
<td>.1104</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>.3312</td>
</tr>
<tr>
<td>Bit #2</td>
<td>2</td>
<td>11/32”</td>
<td>.0928</td>
</tr>
<tr>
<td>Sideport Nozzles - Primary Orifice</td>
<td>7/32”</td>
<td>.0376</td>
<td></td>
</tr>
<tr>
<td>Standard Nozzle</td>
<td>1</td>
<td>10/32”</td>
<td>.0767</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>.3375</td>
</tr>
</tbody>
</table>

**ORIENTATION**
Orientation notches allow for installation in the field by HDBS service representatives.