The selection of an appropriate well screen material for a developing country

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THE SELECTION OF AN APPROPRIATE WELL SCREEN MATERIAL FOR A DEVELOPING COUNTRY

This short paper is an attempt to present in a simple format the important properties of the various materials used in the manufacture of well screens. No attempt is made to describe the size and type of screen openings required for a particular formation or the design of the accompanying gravel pack. These calculations are fully documented in Johnson 1986 and Hunter Blair 1988 and 1970.

The selection of the correct and appropriate well screen is important in any context, but especially so in a developing country where equipment and personnel may not be available to correct any future failure or fault.

An appropriate screen should fulfil the following conditions:

1. The expected life of the screen should be at least similar to the expected life of the rest of the well installation.
2. The material used should not be corroded by the groundwater, and if encrustation is expected the screen material should be unaffected by the chemical or method used to remove the encrustation.
3. The weight and construction of the screen should be such that it can be transported easily and safely by whatever means are readily available.
4. The material should not deteriorate in storage under hot and/or humid conditions.
5. The cost should not be so high that the total number of wells that can be drilled are severely restricted.
6. There is some advantage in having material that can be slotted or constructed in the country of use. Delivery times are frequently so long with imported material that the screen has to be ordered long before the aquifer grading is known, and the correct opening size calculated.

In assessing the benefits of a borehole supply in a developing country some factor should be included for the social and psychological benefit obtained from having a borehole supply working continuously. If frequent screen problems (collapse, blockage) are encountered the users will lose confidence in the new scheme and revert to the old, perhaps polluted source. Cheap first cost and low life materials may thus not be the most satisfactory selection.

Comments on Table

Temperature range - refers only to the temperatures which may be met with in normal working conditions, i.e. storage in the sun.

Corrosion resistance - this refers only to chemical conditions normally found in ground water and chemicals which may be used to regenerate wells.

Transport problems - includes only those transport problems which can be caused by the properties of the material.

Storage problems - includes only those storage problems which can be caused by the properties of the material.

Production cost - the relative costs at place of production.

Total cost - the relative costs including transport and installation.

Suspended length - the maximum length that can be freely suspended in a water well without causing collapse of the screen or failure of the joints.

Opening types - the types of screen openings which are commonly available.

Coded
1 slots
2 perforations
3 wire wound
4 bridge

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DEMCO, Nuneaton Drilling Equipment Manufacturing Co Ltd, Nuneaton, UK
Geotextiles Ltd, Borehamwood, UK
Johnson Screens Europe Ltd, Feltham, UK

Any errors in interpreting the supplied information are however mine.
<table>
<thead>
<tr>
<th>Material</th>
<th>No.</th>
<th>Density (g/cm³)</th>
<th>Effect</th>
<th>Low unless protected</th>
<th>Cost</th>
<th>Storage problems</th>
<th>Suspended casing length</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Carbon Steel</td>
<td>1</td>
<td>7.9</td>
<td>No effect</td>
<td>Low</td>
<td>Weight</td>
<td>High</td>
<td>High</td>
<td>None</td>
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<tr>
<td>Stainless Steel</td>
<td>2</td>
<td>7.8</td>
<td>No effect</td>
<td>V good</td>
<td>Weight</td>
<td>Very High</td>
<td>High</td>
<td>None</td>
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<tr>
<td>Glass reinforced plastic</td>
<td>3</td>
<td>1.8</td>
<td>No effect up to 1000°C</td>
<td>V good</td>
<td>Medium</td>
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<td>Medium</td>
<td>Few delaminates</td>
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<tr>
<td>UPVC</td>
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<td>1.4</td>
<td>0-60°C</td>
<td>V good</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Heat and sunlight</td>
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<tr>
<td>Polyolefin</td>
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<td>0.03</td>
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<td>Brass</td>
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<td>8.4</td>
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<td>Very high</td>
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<tr>
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<td>8 +</td>
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<td>1</td>
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<td>None</td>
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<td>Rainwater PVC</td>
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<td>1.35</td>
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<td>Good</td>
<td>Low</td>
<td>Low</td>
<td>Low</td>
<td>Heat and sunlight</td>
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<td>Yellow PVC</td>
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<td>ABS</td>
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