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

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

Acknowledgements
Thanks are due to the following firms for
the supply of information:
Bristol Composite Materials Engineering Ltd,
Bristol, UK
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 (lbs/cu ft)</th>
<th>Effect</th>
<th>Screen Expose</th>
<th>Cost</th>
<th>Storage Problems</th>
<th>Suspended Casing Length</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Steel</td>
<td>1</td>
<td>7.9</td>
<td>No effect</td>
<td>Low unless protected</td>
<td>Weight</td>
<td>High</td>
<td>None</td>
<td>1 2 3 4 Unlimited</td>
</tr>
<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>None</td>
<td>1 2 3 4 Unlimited</td>
</tr>
<tr>
<td>Glass reinforced plastic</td>
<td>3</td>
<td>1.8</td>
<td>No effect up to 100°C</td>
<td>V good</td>
<td>Medium</td>
<td>High</td>
<td>Few delaminates</td>
<td>1 1000m</td>
</tr>
<tr>
<td>UPVC</td>
<td>4</td>
<td>1.4</td>
<td>0-60°C</td>
<td>V good</td>
<td>Low</td>
<td>Low</td>
<td>Heat and sunlight</td>
<td>1 2 3 250m +</td>
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<tr>
<td>Polyolefin</td>
<td>5</td>
<td>0.23</td>
<td>-10 to +110°C</td>
<td>V good</td>
<td>Low</td>
<td>Low</td>
<td>None</td>
<td>1 2 200m</td>
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<tr>
<td>Brass</td>
<td>6</td>
<td>8.4</td>
<td>No effect</td>
<td>Medium</td>
<td>Weight</td>
<td>Very high</td>
<td>None</td>
<td>1 Unlimited</td>
</tr>
<tr>
<td>Bronze</td>
<td>7</td>
<td>8.4</td>
<td>No effect</td>
<td>Good</td>
<td>Weight</td>
<td>Very High</td>
<td>None</td>
<td>1 Unlimited</td>
</tr>
<tr>
<td>Bamboo</td>
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<td>0.4</td>
<td>No effect</td>
<td>Poor</td>
<td>-</td>
<td>Very low</td>
<td>-</td>
<td>1 3 Low</td>
</tr>
<tr>
<td>Terracotta</td>
<td>9</td>
<td>2.3</td>
<td>-</td>
<td>Good</td>
<td>Weight</td>
<td>Low</td>
<td>None</td>
<td>1 Low</td>
</tr>
<tr>
<td>Rainwater PVC</td>
<td>10</td>
<td>1.35</td>
<td>0-60°C</td>
<td>Good</td>
<td>Low</td>
<td>Low</td>
<td>Heat and sunlight</td>
<td>1 3 Low</td>
</tr>
<tr>
<td>Yellow PVC</td>
<td>11</td>
<td>1.3</td>
<td>0-60°C</td>
<td>Good</td>
<td>Low</td>
<td>Low</td>
<td>Heat and sunlight</td>
<td>1 2 Low</td>
</tr>
<tr>
<td>Rope</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>Poor</td>
<td>Low</td>
<td>Very low</td>
<td>Random</td>
<td>Depends on former</td>
</tr>
<tr>
<td>Polypropylene fabrics</td>
<td>13</td>
<td>Low</td>
<td>-</td>
<td>V good</td>
<td>V low</td>
<td>Low</td>
<td>None</td>
<td>2 Depending on former</td>
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<td>ABS</td>
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<td>1.06</td>
<td>-40 to +85°C</td>
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<td>Low</td>
<td>Low</td>
<td>Heat and sunlight</td>
<td>1 2 150m +</td>
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</table>