Use of API 610 for better Operation and maintenance practice

<table>
<tr><th>Subject</th><th>API 610 reference</th><th>Interpretation to improve operating and maintenance practice</th></tr>
<tr><td colspan="3">Pump operation, its effect on reliability, performance assessment</td></tr>
<tr><td>Pump Operating point and vibration</td><td>6.9.3</td><td>Pump overall vibration at bearing hosing or shaft vibration can increase as high as 30% when pump being operated outside preferred operating region but within allowable operating region</td></tr>
<tr><td>Shutoff pressure test</td><td>6.1.15 / 8.3.3.3</td><td>High energy pump, integral-gear and multistage pumps, migh not be feasible to test at shutoff.</td></tr>
<tr><td>Performance tolerance</td><td>8.3.3</td><td>Head difference of ± 3 % at rated point and ± 5-10 % at close to MCSF is possible
Power could be 4% higher than data sheet reference value</td></tr>
<tr><td colspan="3">Maintenance, repair and overhaul related</td></tr>
<tr><td>Dynamic balancing</td><td>6.9.4</td><td>Impellers, balancing drums and similar major rotating components is recommended to be dynamically balanced to ISO 1940-1, grade G2.5. The mass of the arbor used for balancing shall not exceed the mass of the component being balanced.
If Diameter / width ratio is greater than 6, two-plane balancing is recommended</td></tr>
<tr><td>Mechanical seal hydrotest</td><td>6.8.13 / 8.3.2.9 / 8.3.1.3</td><td>If mechanical seal hydrostatic test is conducted after assembly and repair, test pressure should be less than specified hydrostatic pressure for pressure containing parts, in line with seal manufacturer recommendation and specified in ISO 21049.</td></tr>
<tr><td>Shaft and rotor run out</td><td>9.2.3</td><td>Allowable Shaft and rotor runout is given below.
<table>
<tr><th>Flexibility factor $= L^4/d^2$ mm²</th><th>Allowable shaft runout (TIR in micrometer)</th><th>Component fit on shaft</th><th>Allowable rotor radial runout (TIR in micrometer)</th></tr>
<tr><td rowspan="2">> 1.9 X 10^9</td><td rowspan="2">40</td><td>Clearance</td><td>90</td></tr>
<tr><td>Interference</td><td>60</td></tr>
<tr><td rowspan="2">< 1.9 X 10^9</td><td rowspan="2">25</td><td>Clearance</td><td>75</td></tr>
<tr><td>Interfereance</td><td>50</td></tr>
</table></td></tr>
<tr><td>Mechanical Seal installation</td><td>6.8</td><td>Seal chamber to gland register fit ID or OD should be concentric within 125 Micrometer
Seal chamber face should be within 0.005 micrometer / mm of seal chamber bore</td></tr>
<tr><td>Name plate and DOR</td><td>6.13</td><td>While equipment is old and relevant information is not traceable, It is important and most authentic information regarding pump S/N, DOR and other operating parameters</td></tr>
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Kirit Domadiya