NAS 255NM (UNS N08926) is a high corrosion resistant stainless steel with high contents of chromium and molybdenum, and provides excellent corrosion resistance under severe environments such as high temperature seawater and flue gas desulfurization plants. Depending on the environment, it is a highly economical stainless steel with corrosion resistance comparable to that of Nickel alloy and pure titanium. Nippon Yakin supplies this product in plate, sheet and strip form.

### Steel Grade/Standard

<table>
<thead>
<tr>
<th>NAS</th>
<th>JIS</th>
<th>ASTM A240/B625</th>
<th>EN</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS 255NM</td>
<td>—</td>
<td>UNS N08926</td>
<td>—</td>
</tr>
</tbody>
</table>

### Chemical Composition

<table>
<thead>
<tr>
<th>Specification* (UNS N08926)</th>
<th>C</th>
<th>Si</th>
<th>Mn</th>
<th>P</th>
<th>S</th>
<th>Ni</th>
<th>Cr</th>
<th>Mo</th>
<th>Cu</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>[wt %]</td>
<td>≤0.020</td>
<td>≤0.50</td>
<td>≤2.00</td>
<td>≤0.030</td>
<td>≤0.010</td>
<td>24.0~26.0</td>
<td>19.0~21.0</td>
<td>6.0~7.0</td>
<td>0.5~1.5</td>
<td>0.15~0.25</td>
</tr>
</tbody>
</table>

*ASTM A240

### Physical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density [g/cm³]</td>
<td>8.06</td>
</tr>
<tr>
<td>Specific heat [J/kg · K]</td>
<td>466</td>
</tr>
<tr>
<td>Electrical resistivity [μΩ · cm]</td>
<td>94.7</td>
</tr>
<tr>
<td>Thermal conductivity [W/m · K]</td>
<td>11.8</td>
</tr>
<tr>
<td>Average coefficient of thermal expansion [10⁻⁶/°C]</td>
<td>20~100°C 15.0</td>
</tr>
<tr>
<td></td>
<td>20~200°C 15.4</td>
</tr>
<tr>
<td></td>
<td>20~300°C 15.8</td>
</tr>
<tr>
<td></td>
<td>20~400°C 16.1</td>
</tr>
<tr>
<td>Young's modulus [MPa]</td>
<td>21.1 × 10⁴</td>
</tr>
<tr>
<td>Magnetism</td>
<td>None</td>
</tr>
<tr>
<td>Melting range [°C]</td>
<td>1320~1390</td>
</tr>
</tbody>
</table>

NIPPON YAKIN KOGYO CO., LTD.
### Mechanical Properties

#### Mechanical Properties at Room Temperature

<table>
<thead>
<tr>
<th>Specification (UNS N08926)</th>
<th>0.2% proof stress [MPa]</th>
<th>Tensile strength [MPa]</th>
<th>Elongation [%]</th>
<th>Hardness [HRB]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example Cold-rolled sheet 3mm²</td>
<td>≥295</td>
<td>≥650</td>
<td>≥35</td>
<td>—</td>
</tr>
</tbody>
</table>

### Corrosion Resistance

Because NAS 255NM contains high concentrations of chromium and molybdenum and also contains nitrogen, it displays excellent pitting corrosion resistance and crevice corrosion resistance in chloride environments. NAS 255NM demonstrates excellent corrosion resistance under corrosion environments where it had been difficult to maintain corrosion resistance with conventional duplex stainless steels.

#### Pitting Corrosion Resistance

<table>
<thead>
<tr>
<th>Alloy</th>
<th>ASTM G48 Method A</th>
<th>ASTM G48 Method C</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS 255</td>
<td>○</td>
<td>22°C 50°C CPT (°C)</td>
</tr>
<tr>
<td>NAS 329J3L</td>
<td>○</td>
<td>22°C 50°C CPT (°C)</td>
</tr>
<tr>
<td>NAS 64</td>
<td>○</td>
<td>22°C 50°C CPT (°C)</td>
</tr>
<tr>
<td>NAS 255NM</td>
<td>○</td>
<td>22°C 50°C CPT (°C)</td>
</tr>
</tbody>
</table>

Test conditions:
- ASTM G48 Method A (○: No pitting corrosion, ×: Pitting corrosion)
  - Test solution: 6%FeCl₃
  - Test temperature: 22°C, 50°C (Recommended temperature in this test)
  - Test time: 72h

ASTM G48 Method C
- Test solution: 6%FeCl₃ + 1%HCl
- Test time: 72h

#### Crevice Corrosion Resistance

<table>
<thead>
<tr>
<th>Alloy</th>
<th>ASTM G48 Method D</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS 255</td>
<td>10</td>
</tr>
<tr>
<td>NAS 329J3L</td>
<td>25</td>
</tr>
<tr>
<td>NAS 64</td>
<td>30</td>
</tr>
<tr>
<td>NAS 255NM</td>
<td>40</td>
</tr>
</tbody>
</table>

Test conditions:
- ASTM G48 Method D
  - Test solution: 6%FeCl₃ + 1%HCl
  - Test time: 72h
### Stress Corrosion Cracking Resistance

<table>
<thead>
<tr>
<th>Alloy</th>
<th>45% (155°C)</th>
<th>42% (143°C)</th>
<th>40% (138°C)</th>
<th>38% (134°C)</th>
<th>35% (126°C)</th>
<th>30% (115°C)</th>
<th>25% (110°C)</th>
<th>20% (108°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS 255</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>x</td>
<td>○</td>
<td>○</td>
<td>×</td>
<td>×</td>
</tr>
<tr>
<td>NAS 329J3L</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>NAS 64</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>NAS 255NM</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Test conditions:
- Immersion in boiling MgCl₂ solution
- Test time: 300h
- U-bend test specimen is used.

### Acid Resistance

#### Corrosion rate in sulfuric acid at 80°C (mm/y)

<table>
<thead>
<tr>
<th>Alloy</th>
<th>5%</th>
<th>10%</th>
<th>20%</th>
<th>40%</th>
<th>60%</th>
<th>80%</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS 255</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>0.78</td>
<td>2.95</td>
<td>0.48</td>
<td>5.01</td>
</tr>
<tr>
<td>NAS 329J3L</td>
<td>0.01</td>
<td>0.17</td>
<td>4.65</td>
<td>365.9</td>
<td>1456</td>
<td>106.4</td>
</tr>
<tr>
<td>NAS 64</td>
<td>&lt;0.01</td>
<td>0.02</td>
<td>1.07</td>
<td>191.9</td>
<td>1054</td>
<td>60.72</td>
</tr>
<tr>
<td>NAS 255NM</td>
<td>&lt;0.01</td>
<td>0.02</td>
<td>0.05</td>
<td>1.07</td>
<td>0.34</td>
<td>3.81</td>
</tr>
</tbody>
</table>

Test time: 24h

#### Corrosion rate in hydrochloric acid at 80°C (mm/y)

<table>
<thead>
<tr>
<th>Alloy</th>
<th>0.1%</th>
<th>1%</th>
<th>2%</th>
<th>3%</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS 255</td>
<td>&lt;0.01</td>
<td>0.01</td>
<td>2.70</td>
<td>3.72</td>
</tr>
<tr>
<td>NAS 329J3L</td>
<td>0.02</td>
<td>0.03</td>
<td>31.10</td>
<td>60.62</td>
</tr>
<tr>
<td>NAS 64</td>
<td>0.01</td>
<td>0.01</td>
<td>12.94</td>
<td>30.51</td>
</tr>
<tr>
<td>NAS 255NM</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
<td>3.22</td>
<td>5.66</td>
</tr>
</tbody>
</table>

Test time: 24h

### (Reference)

<table>
<thead>
<tr>
<th>Nippon Yakin</th>
<th>JIS</th>
<th>UNS No.</th>
<th>Chemical composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAS 255</td>
<td>SUS 890L</td>
<td>N08904</td>
<td>20Cr-24Ni-4.3Mo-1.5Cu</td>
</tr>
<tr>
<td>NAS 329J3L</td>
<td>SUS 329J3L</td>
<td>S32205</td>
<td>22Cr-5.3Ni-3.2Mo-0.16N</td>
</tr>
<tr>
<td>NAS 64</td>
<td>SUS 329J4L</td>
<td>S32506</td>
<td>25Cr-6.5Ni-3.3Mo-0.17N</td>
</tr>
<tr>
<td>NAS 255NM</td>
<td>—</td>
<td>N08926</td>
<td>20Cr-25Ni-6Mo-1Cu-0.2N</td>
</tr>
</tbody>
</table>
Cold and hot workability are approximately equal to those of Type 304, 316, and other standard austenitic stainless steels. However, care is necessary for both cold and hot worked materials because they have high strength.

Possible welding methods include shielded metal arc welding, TIG welding, and plasma welding, in the same manner as with standard austenitic stainless steels. As welding consumables, Alloy 276 should be used. Preheating and post-welding heat treatment are not necessary.

As a distinctive feature of high Ni stainless steels, machinability is difficult in comparison with the austenitic stainless steels, but is easier than with Ni-based alloys. Use of a superhard tool whenever possible, together with a slow feed speed and large cut depth, is advised.

Solution annealing of NAS 255NM should be performed at 1100°C and higher followed by being quenched in water or rapidly cooled by other means. (Conditions provided in ASTM A480/A480M)

A mixture of nitric acid and hydrofluoric acid is used in pickling. However, due to the high corrosion resistance of NAS 255NM, scale is somewhat difficult to remove in comparison with Type 304. Therefore, the material should be immersed in an alkaline solution before pickling, or if possible, shot blasting is extremely effective.

- Seawater environments: Seawater desalination equipment, heat exchangers using seawater, condenser tubes, etc.
- High concentration chloride ion environments: Flue gas desulfurization systems, pulp and papermaking industries, various types of bleaching equipment, etc.

For more information, please contact:
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TEL: +81-3-3273-4649  FAX: +81-3-3273-4642
E-Mail: inquiry@nyk.jp
URL: http://www.nyk.co.jp/en/

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