

# HASTELLOY<sup>®</sup> C-4 alloy

## Selected Corrosion Data

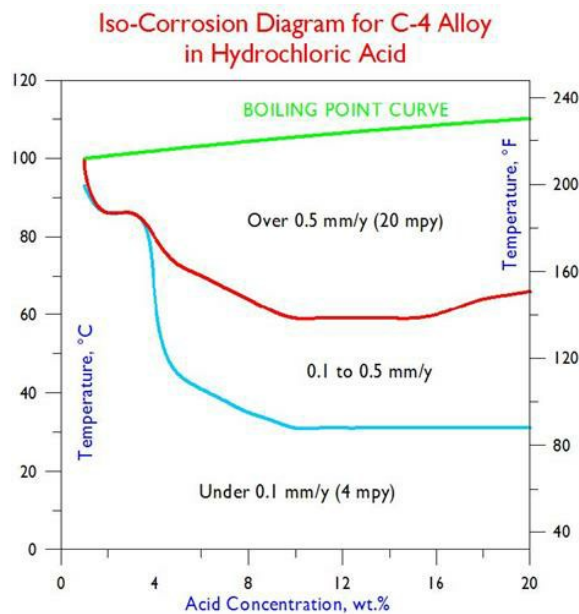
### Hydrochloric Acid

| Conc.<br>Wt.% | 50°F | 75°F | 100°F | 125°F | 150°F | 175°F | 200°F | 225°F | Boiling |
|---------------|------|------|-------|-------|-------|-------|-------|-------|---------|
|               | 10°C | 24°C | 38°C  | 52°C  | 66°C  | 79°C  | 93°C  | 107°C |         |
| 1             | -    | -    | <0.01 | -     | <0.01 | <0.01 | 0.10  | -     | 0.48    |
| 1.5           | -    | -    | -     | -     | -     | -     | -     | -     | -       |
| 2             | -    | -    | -     | -     | 0.01  | 0.03  | -     | -     | 1.99    |
| 2.5           | -    | -    | -     | -     | -     | -     | -     | -     | -       |
| 3             | -    | -    | -     | -     | 0.02  | 0.04  | -     | -     | -       |
| 3.5           | -    | -    | -     | -     | -     | -     | -     | -     | -       |
| 4             | -    | -    | -     | -     | -     | -     | -     | -     | -       |
| 4.5           | -    | -    | -     | -     | -     | -     | -     | -     | -       |
| 5             | -    | -    | <0.01 | 0.27  | 0.42  | 0.98  | -     | -     | 4.37    |
| 7.5           | -    | -    | -     | -     | -     | -     | -     | -     | -       |
| 10            | -    | 0.06 | 0.19  | 0.30  | 0.57  | 1.11  | -     | -     | 6.91    |
| 15            | -    | 0.06 | 0.18  | 0.39  | 0.57  | 1.33  | 2.33  | -     | 6.35    |
| 20            | -    | 0.05 | 0.14  | 0.27  | 0.55  | 1.12  | 2.19  | -     | 5.72    |

All corrosion rates are in millimeters per year (mm/y); to convert to mils (thousandths of an inch) per year, divide by 0.0254.

Data are from Corrosion Laboratory Jobs 2-74 and 73-96.

All tests were performed in reagent grade acids under laboratory conditions; field tests are encouraged prior to industrial use.

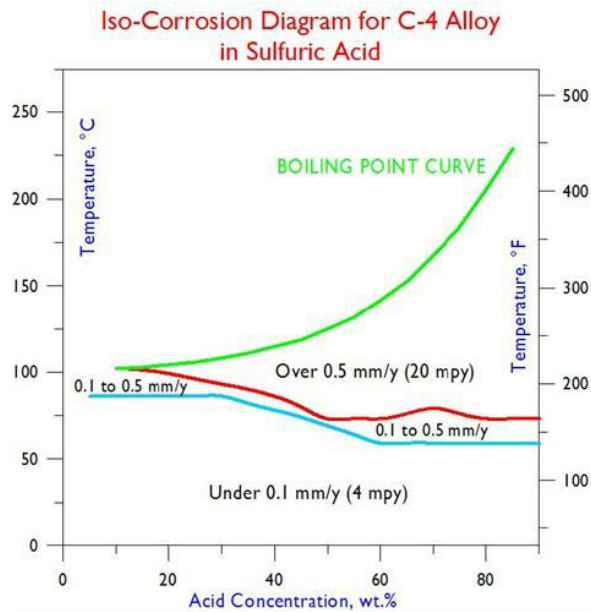


| Conc.<br>Wt. % | 75°F | 100°F | 125°F | 150°F | 175°F | 200°F | 225°F | 250°F | 275°F | 300°F | 350°F | Boiling |
|----------------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
|                | 24°C | 38°C  | 52°C  | 66°C  | 79°C  | 93°C  | 107°C | 121°C | 135°C | 149°C | 177°C |         |
| 1              | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -       |
| 2              | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -       |
| 3              | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -       |
| 4              | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -       |
| 5              | -    | -     | -     | 0.01  | 0.02  | -     | -     | -     | -     | -     | -     | 0.41    |
| 10             | -    | <0.01 | -     | 0.01  | 0.03  | 0.19  | -     | -     | -     | -     | -     | 0.43    |
| 20             | -    | -     | -     | 0.01  | 0.05  | 0.38  | -     | -     | -     | -     | -     | 0.89    |
| 30             | -    | <0.01 | -     | 0.02  | 0.07  | 0.54  | -     | -     | -     | -     | -     | 1.85    |
| 40             | -    | -     | <0.01 | 0.03  | 0.38  | 0.87  | -     | -     | -     | -     | -     | 3.63    |
| 50             | -    | 0.02  | 0.01  | 0.03  | 0.63  | 0.99  | -     | -     | -     | -     | -     | 9.96    |
| 60             | -    | -     | 0.03  | 0.15  | 0.67  | 1.24  | -     | -     | -     | -     | -     | -       |
| 70             | -    | 0.04  | 0.06  | 0.14  | 0.46  | 0.94  | -     | -     | -     | -     | -     | -       |
| 80             | -    | -     | 0.04  | 0.13  | 1.10  | 2.47  | -     | -     | -     | -     | -     | -       |
| 90             | -    | 0.04  | 0.05  | 0.19  | 0.71  | 2.63  | -     | -     | -     | -     | -     | -       |
| 96             | -    | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -       |

All corrosion rates are in millimeters per year (mm/y); to convert to mils (thousandths of an inch) per year, divide by 0.0254.

Data are from Corrosion Laboratory Jobs 19-73, 24-94, and 68-96.

All tests were performed in reagent grade acids under laboratory conditions; field tests are encouraged prior to industrial use.



**Reagent Grade Solutions, mm/y**

| Chemical | Conc. | 100°F | 125°F | 150°F | 175°F | 200°F | Boiling |
|----------|-------|-------|-------|-------|-------|-------|---------|
|          |       | 38°C  | 52°C  | 66°C  | 79°C  | 93°C  |         |
|          | 2.5   | -     | -     | <0.01 | -     | <0.01 | 0.08    |
|          | 5     | -     | -     | <0.01 | 0.01  | 0.76  | -       |

|                           |     |       |       |       |       |      |      |
|---------------------------|-----|-------|-------|-------|-------|------|------|
| <b>Hydrobromic Acid</b>   | 7.5 | -     | -     | 0.03  | 0.18  | 0.76 | -    |
|                           | 10  | -     | <0.01 | 0.37  | 0.53  | -    | -    |
|                           | 15  | <0.01 | 0.24  | 0.37  | 0.56  | -    | -    |
|                           | 20  | 0.15  | 0.24  | 0.35  | 0.51  | -    | -    |
|                           | 30  | 0.10  | 0.16  | 0.23  | 0.41  | 0.67 | -    |
|                           | 40  | -     | 0.11  | 0.17  | 0.28  | 0.44 | -    |
| <b>Hydrochloric Acid</b>  | 1   | <0.01 | -     | <0.01 | <0.01 | 0.10 | 0.48 |
|                           | 2   | -     | -     | 0.01  | 0.03  | -    | 1.99 |
|                           | 3   | -     | -     | 0.02  | 0.04  | -    | -    |
|                           | 5   | <0.01 | 0.27  | 0.42  | 0.98  | -    | -    |
|                           | 10  | 0.19  | 0.30  | 0.57  | 1.11  | -    | -    |
|                           | 15  | 0.18  | 0.39  | 0.57  | 1.33  | -    | -    |
|                           | 20  | 0.14  | 0.27  | 0.55  | 1.12  | -    | -    |
| <b>Hydrofluoric Acid*</b> | 5   | -     | -     | -     | 0.59  | -    | -    |
| <b>Sulfuric Acid</b>      | 10  | <0.01 | -     | 0.01  | 0.03  | 0.19 | 0.43 |
|                           | 20  | -     | -     | 0.01  | 0.05  | 0.38 | 0.89 |
|                           | 30  | <0.01 | -     | 0.02  | 0.07  | 0.54 | 1.85 |
|                           | 40  | -     | <0.01 | 0.03  | 0.38  | 0.87 | -    |
|                           | 50  | 0.02  | 0.01  | 0.03  | 0.63  | 0.99 | -    |
|                           | 60  | -     | 0.03  | 0.15  | 0.67  | 1.24 | -    |
|                           | 70  | 0.04  | 0.06  | 0.14  | 0.46  | 0.94 | -    |
|                           | 80  | -     | 0.04  | 0.13  | 1.10  | 2.47 | -    |
|                           | 90  | 0.04  | 0.05  | 0.19  | 0.71  | 2.63 | -    |