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# NCH2

## Nickel Chrome Type 2

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# Alloys : NCH2 (Nickel Chrome Type 2)

[JIS C 2520]

[JIS C 2532]

Compared to nickel-chrome type 1, it has slightly lower oxidation resistance and high-temperature strength, and is weakly magnetic.

Since it has good cold workability and corrosion resistance, it is suitable for electric furnaces, electric heaters, resistors, etc., in the same way as Type 1 except for the operating temperature.

| JIS    | JIS Code | Electrical Resistivity<br>[ $\mu\Omega\text{m}$ ] | Average TCR<br>[ $\times 10^{-6}/^{\circ}\text{C}$ ] |
|--------|----------|---|--|
| NCH2   | C 2520   | 1.12 $\pm$ 0.05                                   | * 180  |
| GNC112 | C 2532   |   |  |

(\* )Reference value

| Cuprous Electromotive Force<br>Mv/K<br>(0~100°C) | Thermal Expansion Coefficient<br>$\times 10^{-6}/$ | Specific Heat<br>J/g·K<br>(20°C) | Thermal Conductivity<br>w/m·K | Density<br>g/cm <sup>3</sup><br>(20°C) | Melting Point<br>°C | Max Operating Temperature<br>°C |
|--|--|----------------------------------|-------------------------------|--|---------------------|---------------------------------|
| -0.1 ~ +0.3                                      | 17.0   | 0.46                             | 13                            | 8.25                                   | 1400                | 1000                            |

| Chemical Composition | C           | Si       | Mn         | Ni        | Cr    | Fe  |
|----------------------|-------------|----------|------------|-----------|-------|-----|
| (%)                  | $\leq 0.15$ | 0.75~1.6 | $\leq 1.5$ | $\geq 57$ | 15~18 | BAL |

## Resistance increase by temperature

| °C          | 20    | 100   | 200   | 300   | 400   | 500   | 600   | 700   | 800   | 900   | 1000  |
|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Coefficient | 1.000 | 1.014 | 1.031 | 1.048 | 1.065 | 1.077 | 1.083 | 1.085 | 1.090 | 1.095 | 1.103 |

| Alloys | Type   | Diameter (mm)          |                                 |
|--------|--------|------------------------|---------------------------------|
| NCHW2  | Wire   | $\phi 6.00 \sim 0.030$ |                                 |
| NCHR2  | Ribbon | t=2.90~0.08            | w=40~0.4 (Depends on thickness) |
| NCH2P  | Plate  | Please consult         |                                 |
| NCH2   | Foil   | Please consult         |                                 |

# NCH2 (Nickel Chrome Type 2)

## Resistance·Length·Weight

Wire Electrical Resistivity (23°CμΩm) 1.12±0.05

| Diameter (mm) | Tolerance (mm) | Cross section (mm <sup>2</sup> ) | Resistance Tolerance (%) | DC Resistance (Ω/m) | Length (m/Kg) | Weight (g/m) |
|---------------|----------------|----------------------------------|--------------------------|---------------------|---------------|--------------|
| 6.00          | ±0.080         | 28.27                            | ±5                       | 0.0396              | 4.29          | 233          |
| 5.50          | ±0.063         | 23.76                            | ±5                       | 0.0471              | 5.10          | 196          |
| 5.00          | ±0.063         | 19.64                            | ±5                       | 0.0570              | 6.17          | 162          |
| 4.50          | ±0.063         | 15.90                            | ±5                       | 0.0704              | 7.62          | 131          |
| 4.00          | ±0.063         | 12.57                            | ±5                       | 0.0891              | 9.65          | 104          |
| 3.50          | ±0.050         | 9.621                            | ±5                       | 0.116               | 12.6          | 79.4         |
| 3.20          | ±0.050         | 8.042                            | ±5                       | 0.139               | 15.1          | 66.4         |
| 2.90          | ±0.050         | 6.605                            | ±5                       | 0.170               | 18.4          | 54.5         |
| 2.60          | ±0.040         | 5.309                            | ±5                       | 0.211               | 22.8          | 43.8         |
| 2.30          | ±0.040         | 4.155                            | ±5                       | 0.270               | 29.2          | 34.3         |
| 2.00          | ±0.040         | 3.142                            | ±5                       | 0.357               | 38.6          | 25.9         |
| 1.80          | ±0.040         | 2.545                            | ±5                       | 0.440               | 47.6          | 21.0         |
| 1.60          | ±0.032         | 2.011                            | ±5                       | 0.557               | 60.3          | 16.6         |
| 1.50          | ±0.032         | 1.767                            | ±5                       | 0.634               | 68.6          | 14.6         |
| 1.40          | ±0.032         | 1.539                            | ±5                       | 0.728               | 78.7          | 12.7         |
| 1.30          | ±0.032         | 1.327                            | ±5                       | 0.844               | 91.3          | 11.0         |
| 1.20          | ±0.025         | 1.131                            | ±5                       | 0.99                | 107           | 9.33         |
| 1.10          | ±0.025         | 0.9503                           | ±6                       | 1.18                | 128           | 7.84         |
| 1.00          | ±0.025         | 0.7854                           | ±6                       | 1.43                | 154           | 6.48         |
| 0.90          | ±0.025         | 0.6362                           | ±6                       | 1.76                | 191           | 5.25         |
| 0.85          | ±0.025         | 0.5675                           | ±6                       | 1.97                | 214           | 4.68         |
| 0.80          | ±0.020         | 0.5027                           | ±6                       | 2.23                | 241           | 4.15         |
| 0.75          | ±0.020         | 0.4418                           | ±6                       | 2.54                | 274           | 3.64         |
| 0.70          | ±0.020         | 0.3848                           | ±6                       | 2.91                | 315           | 3.17         |
| 0.65          | ±0.020         | 0.3318                           | ±6                       | 3.38                | 365           | 2.74         |
| 0.60          | ±0.020         | 0.2827                           | ±6                       | 3.96                | 429           | 2.33         |
| 0.55          | ±0.016         | 0.2376                           | ±7                       | 4.71                | 510           | 1.96         |
| 0.50          | ±0.016         | 0.1964                           | ±7                       | 5.70                | 617           | 1.62         |
| 0.45          | ±0.016         | 0.1590                           | ±7                       | 7.04                | 762           | 1.31         |
| 0.40          | ±0.016         | 0.1257                           | ±7                       | 8.91                | 965           | 1.04         |
| 0.35          | ±0.013         | 0.09621                          | ±7                       | 11.6                | 1260          | 0.79         |
| 0.32          | ±0.013         | 0.08042                          | ±7                       | 13.9                | 1507          | 0.66         |
| 0.29          | ±0.013         | 0.06605                          | ±7                       | 17.0                | 1835          | 0.54         |
| 0.26          | ±0.010         | 0.05309                          | ±8                       | 21.1                | 2283          | 0.438        |
| 0.23          | ±0.010         | 0.04155                          | ±8                       | 27.0                | 2917          | 0.343        |
| 0.20          | ±0.010         | 0.03142                          | ±8                       | 35.7                | 3858          | 0.259        |
| 0.18          | ±0.008         | 0.02545                          | ±8                       | 44.0                | 4763          | 0.210        |
| 0.16          | ±0.008         | 0.02011                          | ±8                       | 55.7                | 6029          | 0.166        |
| 0.15          | ±0.008         | 0.01767                          | ±8                       | 63.4                | 6859          | 0.146        |
| 0.14          | ±0.008         | 0.01539                          | ±8                       | 72.8                | 7874          | 0.127        |
| 0.13          | ±0.006         | 0.01327                          | ±9                       | 84.4                | 9132          | 0.110        |
| 0.12          | ±0.006         | 0.01131                          | ±9                       | 99.0                | 10717         | 0.0933       |
| 0.11          | ±0.006         | 0.009503                         | ±9                       | 118                 | 12755         | 0.0784       |
| 0.10          | ±0.006         | 0.007854                         | ±9                       | 143                 | 15433         | 0.0648       |
| 0.09          | ±0.006         | 0.006362                         | ±10                      | 176                 | 19053         | 0.0525       |
| 0.08          | ±0.005         | 0.005027                         | ±10                      | 223                 | 24114         | 0.0415       |
| 0.07          | ±0.005         | 0.003848                         | ±10                      | 291                 | 31496         | 0.0317       |
| 0.06          | ±0.004         | 0.002827                         | ±11                      | 396                 | 42870         | 0.0233       |
| 0.05          | ±0.004         | 0.001964                         | ±11                      | 570                 | 61733         | 0.0162       |
| 0.04          | ±0.003         | 0.001257                         | ±12                      | 891                 | 96457         | 0.0104       |
| 0.03          | ±0.003         | 0.0007069                        | ±12                      | 1584                | 171480        | 0.00583      |

# NCH2 (Nickel Chrome Type 2)

## Temperature Current Characteristics · Diameter · Temperature · Current

Wire Electrical Resistivity (23°CμΩm) 1.12±0.05 [Unit: Ampere]

| Diameter (mm) | 200 (°C) | 300 (°C) | 400 (°C) | 500 (°C) | 600 (°C) | 700 (°C) | 800 (°C) | 900 (°C) | 1000 (°C) | 1100 (°C) |
|---------------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|
| 6.00          | 53.8     | 74.9     | 94.1     | 114      | 141      | 168      | 202      | 240      | 278       | 312       |
| 5.50          | 47.0     | 66.2     | 93.1     | 101      | 125      | 149      | 182      | 211      | 245       | 278       |
| 5.00          | 41.3     | 56.6     | 72.0     | 86.4     | 108      | 130      | 157      | 182      | 211       | 240       |
| 4.50          | 34.6     | 48.0     | 61.4     | 73.9     | 90.2     | 110      | 134      | 154      | 182       | 206       |
| 4.00          | 29.8     | 40.3     | 51.8     | 62.4     | 76.8     | 90.2     | 108      | 128      | 153       | 173       |
| 3.50          | 24.0     | 32.6     | 42.2     | 50.9     | 63.4     | 74.9     | 92.2     | 108      | 125       | 144       |
| 3.20          | 21.1     | 28.8     | 37.4     | 44.2     | 54.7     | 65.3     | 79.7     | 94.1     | 109       | 125       |
| 2.90          | 18.0     | 25.0     | 32.6     | 38.4     | 47.0     | 56.6     | 69.1     | 80.6     | 94.1      | 107       |
| 2.60          | 14.9     | 21.1     | 26.9     | 32.6     | 40.3     | 48.0     | 59.5     | 69.1     | 79.7      | 89.3      |
| 2.30          | 12.7     | 17.4     | 23.0     | 27.8     | 33.6     | 40.3     | 49.9     | 57.6     | 66.2      | 75.8      |
| 2.00          | 10.6     | 14.4     | 19.2     | 23.0     | 27.8     | 33.6     | 39.4     | 47.0     | 53.8      | 61.4      |
| 1.80          | 9.31     | 12.7     | 16.6     | 20.2     | 24.0     | 28.8     | 31.7     | 40.3     | 46.1      | 52.8      |
| 1.60          | 7.87     | 10.8     | 14.4     | 16.8     | 20.2     | 25.0     | 29.8     | 33.6     | 39.4      | 44.2      |
| 1.50          | 7.30     | 10.0     | 13.1     | 15.4     | 18.7     | 22.1     | 26.9     | 30.7     | 35.5      | 40.3      |
| 1.40          | 6.72     | 9.12     | 12.0     | 14.0     | 17.3     | 20.2     | 25.0     | 27.8     | 32.6      | 37.4      |
| 1.30          | 6.14     | 8.35     | 10.8     | 12.8     | 15.6     | 18.2     | 22.1     | 25.0     | 28.8      | 33.6      |
| 1.20          | 5.66     | 7.49     | 10.1     | 11.3     | 13.4     | 15.5     | 19.2     | 22.1     | 25.9      | 29.8      |
| 1.10          | 4.99     | 6.72     | 8.64     | 10.4     | 12.5     | 14.8     | 17.5     | 20.2     | 23.0      | 25.9      |
| 1.00          | 4.51     | 5.86     | 7.68     | 9.02     | 11.0     | 13.0     | 14.9     | 16.8     | 19.2      | 22.1      |
| 0.90          | 3.94     | 5.28     | 6.82     | 7.87     | 9.60     | 11.3     | 13.4     | 15.4     | 17.5      | 20.2      |
| 0.85          | 3.74     | 4.90     | 6.34     | 7.39     | 8.93     | 10.4     | 12.3     | 14.2     | 16.3      | 18.5      |
| 0.80          | 3.36     | 4.51     | 5.86     | 6.72     | 8.16     | 9.60     | 11.3     | 13.0     | 14.9      | 16.8      |
| 0.75          | 3.17     | 4.13     | 5.38     | 6.24     | 7.49     | 8.64     | 10.3     | 11.9     | 13.4      | 15.4      |
| 0.70          | 2.88     | 3.74     | 4.90     | 5.66     | 6.82     | 7.97     | 9.31     | 10.6     | 12.4      | 14.1      |
| 0.65          | 2.69     | 3.46     | 4.51     | 5.18     | 6.24     | 7.20     | 8.35     | 9.60     | 11.1      | 12.7      |
| 0.60          | 2.40     | 3.07     | 4.03     | 4.61     | 5.57     | 6.53     | 7.49     | 8.64     | 9.89      | 11.5      |
| 0.55          | 2.21     | 2.78     | 3.65     | 4.13     | 4.99     | 5.76     | 6.72     | 7.68     | 8.83      | 10.1      |
| 0.50          | 1.92     | 2.50     | 3.26     | 3.65     | 4.42     | 5.09     | 6.05     | 6.82     | 7.87      | 8.83      |
| 0.45          | 1.73     | 2.21     | 2.78     | 3.17     | 3.84     | 4.42     | 4.99     | 5.66     | 6.43      | 7.30      |
| 0.40          | 1.44     | 1.82     | 2.40     | 2.78     | 3.26     | 3.74     | 4.32     | 4.99     | 5.66      | 6.43      |
| 0.35          | 1.21     | 1.54     | 2.02     | 2.40     | 2.78     | 3.17     | 3.55     | 4.13     | 4.61      | 5.28      |
| 0.32          | 1.08     | 1.39     | 1.79     | 2.11     | 2.50     | 2.78     | 3.26     | 3.74     | 4.22      | 4.70      |
| 0.29          | 0.960    | 1.25     | 1.58     | 1.82     | 2.21     | 2.50     | 2.88     | 3.26     | 3.65      | 4.13      |
| 0.26          | 0.845    | 1.08     | 1.39     | 1.63     | 1.92     | 2.21     | 2.50     | 2.78     | 3.17      | 3.55      |
| 0.23          | 0.730    | 0.960    | 1.20     | 1.39     | 1.63     | 1.82     | 2.11     | 2.40     | 2.69      | 3.07      |
| 0.20          | 0.614    | 0.806    | 1.01     | 1.16     | 1.36     | 1.56     | 1.78     | 2.02     | 2.30      | 2.50      |
| 0.18          | 0.538    | 0.710    | 0.883    | 1.02     | 1.20     | 1.36     | 1.56     | 1.78     | 1.92      | 2.21      |
| 0.16          | 0.470    | 0.614    | 0.758    | 0.874    | 1.02     | 1.18     | 1.34     | 1.54     | 1.72      | 1.90      |
| 0.15          | 0.432    | 0.566    | 0.701    | 0.806    | 0.941    | 1.08     | 1.25     | 1.40     | 1.56      | 1.73      |
| 0.14          | 0.403    | 0.528    | 0.643    | 0.749    | 0.864    | 1.01     | 1.15     | 1.29     | 1.44      | 1.58      |
| 0.13          | 0.365    | 0.480    | 0.586    | 0.682    | 0.787    | 0.912    | 1.05     | 1.17     | 1.32      | 1.44      |
| 0.12          | 0.336    | 0.442    | 0.538    | 0.614    | 0.710    | 0.826    | 0.960    | 1.06     | 1.18      | 1.30      |
| 0.11          | 0.298    | 0.403    | 0.480    | 0.557    | 0.643    | 0.739    | 0.845    | 0.960    | 1.06      | 1.15      |
| 0.10          | 0.269    | 0.355    | 0.432    | 0.499    | 0.566    | 0.653    | 0.749    | 0.845    | 0.941     | 1.03      |
| 0.09          | 0.221    | 0.298    | 0.355    | 0.422    | 0.490    | 0.547    | 0.614    | 0.739    | 0.749     | 0.826     |
| 0.08          | 0.192    | 0.259    | 0.307    | 0.365    | 0.422    | 0.470    | 0.528    | 0.586    | 0.643     | 0.701     |
| 0.07          | 0.163    | 0.211    | 0.259    | 0.307    | 0.355    | 0.394    | 0.442    | 0.490    | 0.538     | 0.586     |
| 0.06          | 0.134    | 0.182    | 0.221    | 0.250    | 0.288    | 0.384    | 0.365    | 0.403    | 0.442     | 0.480     |
| 0.05          | 0.106    | 0.144    | 0.173    | 0.202    | 0.230    | 0.259    | 0.288    | 0.317    | 0.346     | 0.374     |
| 0.04          | 0.077    | 0.106    | 0.125    | 0.144    | 0.173    | 0.192    | 0.211    | 0.230    | 0.250     | 0.278     |
| 0.03          | 0.058    | 0.067    | 0.086    | 0.096    | 0.115    | 0.125    | 0.144    | 0.154    | 0.173     | 0.182     |

(\*) Reference value

# NCH2 (Nickel Chrome Type 2)

## Conductor resistance

Ribbon

Electrical Resistivity (23°CμΩm) 1.12±0.05

[Unit:Ω/m]

| Thickness<br>(mm) | Width (mm) |        |        |        |        |        |        |        |       |       |       |      |      |      |
|-------------------|------------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|------|------|------|
|                   | 40.0       | 32.0   | 25.0   | 20.0   | 16.0   | 13.0   | 10.0   | 6.5    | 5.0   | 3.2   | 2.4   | 1.6  | 0.8  | 0.4  |
| 2.90              | 0.00985    | 0.0123 | 0.0158 | 0.0197 | 0.0246 | 0.0303 | 0.0394 |        |       |       |       |      |      |      |
| 2.60              | 0.011      | 0.0137 | 0.0176 | 0.022  | 0.0275 | 0.0338 | 0.044  | 0.069  |       |       |       |      |      |      |
| 2.30              | 0.0124     | 0.0155 | 0.0199 | 0.0248 | 0.0311 | 0.0382 | 0.0497 | 0.078  | 0.10  |       |       |      |      |      |
| 2.00              | 0.0143     | 0.0179 | 0.0229 | 0.0286 | 0.0357 | 0.044  | 0.0571 | 0.0897 | 0.117 |       |       |      |      |      |
| 1.80              | 0.0159     | 0.0198 | 0.0254 | 0.0317 | 0.0397 | 0.0488 | 0.0635 | 0.0997 | 0.13  |       |       |      |      |      |
| 1.60              | 0.0179     | 0.0223 | 0.0286 | 0.0357 | 0.0446 | 0.0549 | 0.0714 | 0.112  | 0.146 |       |       |      |      |      |
| 1.40              | 0.0204     | 0.0255 | 0.0327 | 0.0408 | 0.051  | 0.0628 | 0.0816 | 0.128  | 0.167 |       |       |      |      |      |
| 1.20              | 0.0238     | 0.0298 | 0.0381 | 0.0476 | 0.0595 | 0.0733 | 0.0952 | 0.15   | 0.194 |       |       |      |      |      |
| 1.00              | 0.0286     | 0.0357 | 0.0457 | 0.0571 | 0.0714 | 0.0879 | 0.114  | 0.179  | 0.233 |       |       |      |      |      |
| 0.90              |            | 0.0397 | 0.0508 | 0.0635 | 0.0794 | 0.0977 | 0.127  | 0.199  | 0.259 | 0.405 | 0.54  |      |      |      |
| 0.80              |            | 0.0446 | 0.0571 | 0.0714 | 0.0893 | 0.11   | 0.143  | 0.224  | 0.292 | 0.456 | 0.608 |      |      |      |
| 0.70              |            |        | 0.0653 | 0.0816 | 0.102  | 0.126  | 0.163  | 0.256  | 0.333 | 0.521 | 0.694 |      |      |      |
| 0.60              |            |        | 0.0762 | 0.0952 | 0.119  | 0.147  | 0.19   | 0.299  | 0.389 | 0.608 | 0.81  |      |      |      |
| 0.50              |            |        | 0.0914 | 0.114  | 0.143  | 0.176  | 0.229  | 0.359  | 0.467 | 0.729 | 0.972 |      |      |      |
| 0.45              |            |        | 0.1020 | 0.127  | 0.159  | 0.195  | 0.254  | 0.399  | 0.52  | 0.81  | 1.08  | 1.62 |      |      |
| 0.40              |            |        |        |        | 0.179  | 0.22   | 0.286  | 0.449  | 0.583 | 0.911 | 1.22  | 1.82 |      |      |
| 0.35              |            |        |        |        |        | 0.251  | 0.327  | 0.513  | 0.667 | 1.04  | 1.39  | 2.08 |      |      |
| 0.32              |            |        |        |        |        | 0.275  | 0.357  | 0.561  | 0.73  | 1.14  | 1.52  | 2.28 |      |      |
| 0.29              |            |        |        |        |        |        | 0.394  | 0.619  | 0.805 | 1.26  | 1.68  | 2.51 | 5.03 |      |
| 0.26              |            |        |        |        |        |        | 0.44   | 0.69   | 0.897 | 1.4   | 1.87  | 2.80 | 5.61 | 11.2 |
| 0.23              |            |        |        |        |        |        |        | 0.78   | 1.01  | 1.59  | 2.11  | 3.17 | 6.34 | 12.7 |
| 0.20              |            |        |        |        |        |        |        | 0.897  | 1.17  | 1.82  | 2.43  | 3.65 | 7.29 | 14.6 |
| 0.18              |            |        |        |        |        |        |        | 0.997  | 1.3   | 2.03  | 2.70  | 4.05 | 8.1  | 16.2 |
| 0.16              |            |        |        |        |        |        |        |        |       | 2.28  | 3.04  | 4.56 | 9.11 | 18.2 |
| 0.14              |            |        |        |        |        |        |        |        |       | 2.6   | 3.47  | 5.21 | 10.4 | 20.8 |
| 0.12              |            |        |        |        |        |        |        |        |       |       | 4.05  | 6.08 | 12.2 | 24.3 |
| 0.10              |            |        |        |        |        |        |        |        |       |       |       | 7.29 | 14.6 | 29.2 |
| 0.08              |            |        |        |        |        |        |        |        |       |       |       | 9.11 | 18.2 | 36.5 |

\*Allowable tolerance of conductor resistance : Width 10mm or more ±7% , Width 10mm or less ±8%

## Conductor Resistance Tolerance of Ribbon

| Thickness<br>[mm]   | Width<br>[mm] | Resistance<br>Tolerance<br>[%] |
|---------------------|---------------|--------------------------------|
| 0.08above 3.15below | 10below       | ±8                             |
|                     | 10above       | ±7                             |

\*We can manufacture products other than the standard (size and tolerance), so please contact us.