

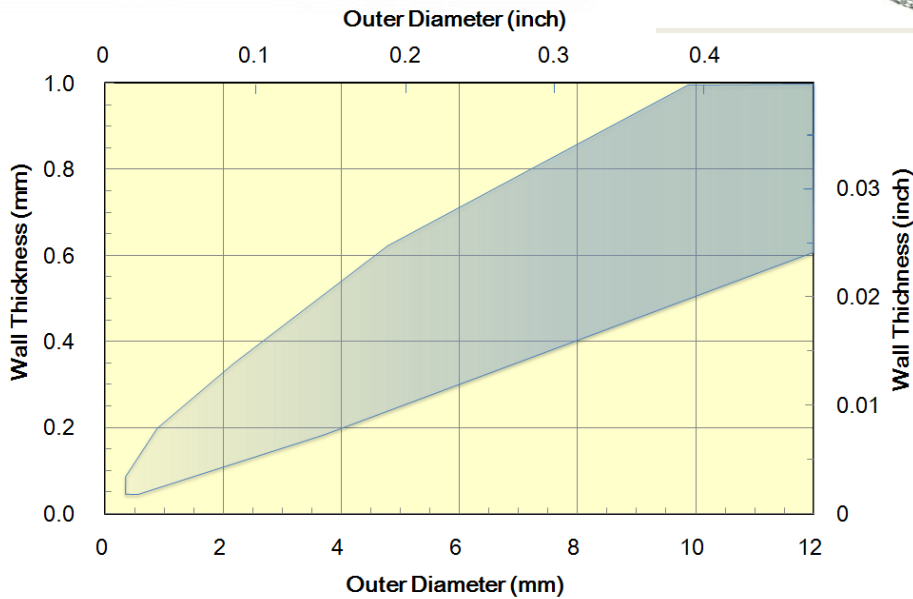
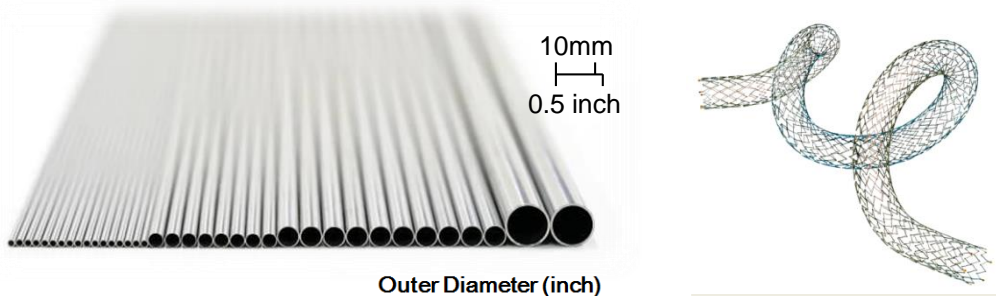
## Ni-Ti Tubes for Medical Devices

Furukawa Techno Material  
2E-GISI-08-01\_Rev.3

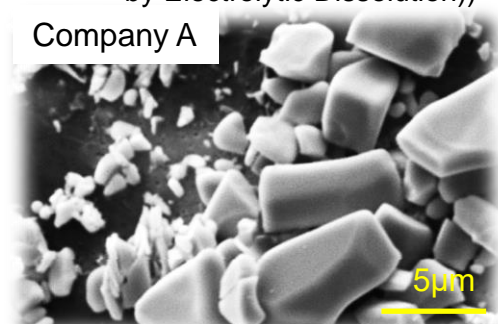
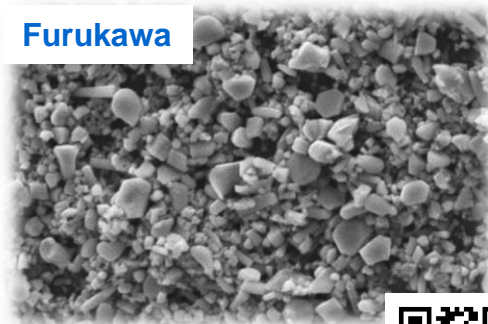
Furukawa Ni-Ti Tube has been selected for many medical devices such as Stents. Available in wide range of sizes with the strict OD & ID dimensions throughout the length assuring the tight WT uniformity to meet different requirements for various customers.

Furukawa has unique vacuum melting and production lines. The most durable (good fatigue life) alloys available in the market are manufactured through fine control of the disperse of inclusions. Our alloy conforms with ASTM F 2063, the Ni-Ti alloy standard for medical devices.

A truly integrated production brings customized formulations available. You can choose a custom designed super-elasticity.



Comparison of inclusions (after SPEED method (Selective Potentiostatic Etching by Electrolytic Dissolution))



## Ni-Ti Tube for Medical Devices

Furukawa Techno Material  
2E-GISI-12-23 Rev.2

### 1. Alloy type & composition

| Alloy type | Composition |            | Ingot Af<br>°C |
|------------|-------------|------------|----------------|
|            | at%         | mass%      |                |
| NT-N       | 50.95Ni-Ti  | 56.01Ni-Ti | -10 ~ 12       |
| NT-E4      | 50.85Ni-Ti  | 55.91Ni-Ti | 5 ~ 28         |
| NT-E9      | 50.70Ni-Ti  | 55.76Ni-Ti | 20 ~ 35        |

| Minor elements, mass% |            |
|-----------------------|------------|
| C                     | max. 0.050 |
| Co                    | max. 0.050 |
| Cu                    | max. 0.010 |
| Cr                    | max. 0.010 |
| H*                    | max. 0.005 |
| Fe                    | max. 0.050 |
| Nb                    | max. 0.025 |
| N+O                   | max. 0.050 |

| Metallurgical properties               |         |
|--|---------|
| Dimension of inclusions and porosities | Area    |
| < 39 µm                                | < 2.5 % |

Comply with ASTM F 2063-05

Comply with ASTM F 2063-05

\* H: final tube

### 2. Dimension

| Available range |                | Standard tolerance +/- |       |
|-----------------|----------------|------------------------|-------|
| Outer diameter  | Wall thickness | OD                     | WT    |
| 0.3 ~ 0.6       | 0.040 ~ 0.060  | 0.015                  | 0.015 |
| 0.8 ~ 2.5       | 0.100 ~ 0.400  | 0.020                  | 0.020 |
| 3.5 ~ 5.0       | 0.160 ~ 0.400  | 0.030                  | 0.030 |
| 5.0 ~ 10.0      | 0.200 ~ 0.460  | 0.050                  | 0.030 |
| 10.0 ~ 11.0     | 0.350 ~ 0.600  | 0.050                  | 0.030 |
| 11.0 ~ 13.0     | 0.400 ~ 0.700  | 0.050                  | 0.040 |

| Available range |                 | Standard tolerance +/- |        |
|-----------------|-----------------|------------------------|--------|
| Outer diameter  | Wall thickness  | OD                     | WT     |
| 0.013 ~ 0.024   | 0.0016 ~ 0.0024 | 0.0006                 | 0.0006 |
| 0.031 ~ 0.098   | 0.0039 ~ 0.0157 | 0.0008                 | 0.0008 |
| 0.138 ~ 0.197   | 0.0063 ~ 0.0157 | 0.0012                 | 0.0012 |
| 0.197 ~ 0.394   | 0.0079 ~ 0.0181 | 0.0020                 | 0.0012 |
| 0.394 ~ 0.433   | 0.0138 ~ 0.0236 | 0.0020                 | 0.0012 |
| 0.433 ~ 0.512   | 0.0157 ~ 0.0276 | 0.0020                 | 0.0016 |

### 3. Transformation temperature and mechanical property

| Alloy type | Mechanical Af*<br>°C | 3% UPS<br>MPa (ksi) | 6% PS<br>% | UTS<br>MPa (ksi) | Elongation<br>% |
|------------|----------------------|---------------------|------------|------------------|-----------------|
| NT-N       | -5 ~ 10              | > 400 (58)          | 0.5        | > 1050 (152)     | > 10            |
| NT-E4      | 0 ~ 15               | > 350 (50)          | 0.5        | > 1000 (145)     |                 |
| NT-E9      | 10 ~ 25              | > 320 (46)          | —          | > 1000 (145)     |                 |

\* Based on BFR (Bending Free Recovery)

\*\* Tensile test at Room Temperature

### 4. Surface condition

|            |          |                     |
|------------|----------|---------------------|
| Outer      | No oxide | Centerless grinding |
|            |          | Pickled             |
| Thin oxide |          |                     |
| Inner      | No oxide | Pickled             |
|            |          | Thin - black oxide  |

