

High Quality Solutions for the Semicon Industry

Optinova SEMICON solutions are best suited to offer high quality tubing for critical processes within semiconductor manufacturing.

Where ever high purity PFA tubing is required for the transport of aggressive chemicals or ultra-pure water, our high quality tubing is suitable to do the work.

With SEMI F57 tested products, Optinova can supply tubing made of different raw material grades from Chemours (450HP, 451HP, 950/951HP PLUS) and/or Daikin (AP230, AP230SH, AP231SH) to meet your application parameters.

For less critical application areas, we can supply Modified PTFE tubing or PVdF tubing to offer a cost efficient alternative to PFA.

WE EMPOWER OUR CUSTOMERS THROUGH HIGHLY RELIABLE TUBING SOLUTIONS

Key Advantages

- High purity premium HP PFA materials
- from Chemours and / or Daikin.
- All PFA tubes tested acc. to SEMI
- F57-0622 and SEMI C90 standards
- Excellent inner surface roughness
- ISO9001 and ISO14001 certified
- production
- Special packaging solutions available
- Laser marking upon request

Applications

- Bulk chemical distribution systems
- Chemical mechanical planarization
- Wafer cleaning and packing
- Ultra pure water supply
- Chemical waste collection
- Slurry supply

Contact our sales offices or visit our website for more information about sample and specifications.

| Standard Sizes | | | | | |
|---|---------|-----------|--------|---------|---------|
| ID mm | wall mm | wall inch | OD mm | OD inch | OD size |
| 1.590 | 0.795 | 0.031 | 3.175 | 0.125 | 1/8" |
| 3.180 | 1.585 | 0.062 | 6.350 | 0.250 | 1/4" |
| 4.760 | 0.795 | 0.031 | 6.350 | 0.250 | 1/4" |
| 3.970 | 1.190 | 0.047 | 6.350 | 0.250 | 1/4" |
| 6.350 | 1.590 | 0.063 | 9.530 | 0.375 | 3/8" |
| 6.350 | 0.795 | 0.031 | 7.940 | 0.313 | 5/16" |
| 7.940 | 0.795 | 0.031 | 9.530 | 0.375 | 3/8" |
| 9.530 | 1.585 | 0.062 | 12.700 | 0.500 | 1/2" |
| 12.700 | 1.585 | 0.062 | 15.880 | 0.625 | |
| 15.880 | 1.585 | 0.062 | 19.050 | 0.750 | 3/4" |
| 19.050 | 1.590 | 0.063 | 22.230 | 0.875 | |
| 22.230 | 1.585 | 0.062 | 25.400 | 1.000 | 1" |
| 25.400 | 1.585 | 0.062 | 28.570 | 1.125 | 1 1/8" |
| 27.950 | 1.900 | 0.075 | 31.750 | 1.250 | 1 1/4" |
| 28.570 | 1.590 | 0.063 | 31.750 | 1.250 | 1 1/4" |
| 28.000 | 1.900 | 0.075 | 31.800 | 1.252 | 1 1/4" |
| 33.720 | 2.190 | 0.086 | 38.100 | 1.500 | 1 1/2" |
| 40.000 | 2.190 | 0.086 | 44.380 | 1.747 | |
| 2.000 | 0.500 | 0.019 | 3.000 | 0.118 | |
| 2.000 | 1.000 | 0.039 | 4.000 | 0.157 | |
| 3.000 | 0.500 | 0.019 | 4.000 | 0.157 | |
| 4.000 | 1.000 | 0.039 | 6.000 | 0.236 | |
| 6.000 | 1.000 | 0.039 | 8.000 | 0.314 | |
| 8.000 | 1.000 | 0.039 | 10.000 | 0.393 | |
| 10.000 | 1.000 | 0.039 | 12.000 | 0.472 | |
| Other sizes up to 4" OD available upon request Delivery in coils or straight piece | | | | | |

| Standard Tolerances | | | | | |
|---------------------|------------|--------------|-----------|--------------|----------------|
| OD mm | OD Tol. mm | OD Tol. inch | Wall mm | Wall Tol. mm | Wall Tol. inch |
| >1,99 | +/-0,07 | +/-0,003 | >0,30 | +/-0,05 | +/-0,002 |
| 2,00-3,99 | +/-0,08 | +/-0,003 | 0,31-0,70 | +/-0,08 | +/-0,003 |
| 4,00-7,99 | +/-0,10 | +/-0,004 | 0,71-1,00 | +/-0,10 | +/-0,004 |
| 8,00-9,99 | +/-0,12 | +/-0,005 | 1,01-1,30 | +/-0,12 | +/-0,005 |
| 10,00-11,99 | +/-0,15 | +/-0,006 | 1,31-1,60 | +/-0,15 | +/-0,006 |
| 12,00-15,99 | +/-0,20 | +/-0,008 | 1,61-2,00 | +/-0,20 | +/-0,008 |
| 16,00-17,99 | +/-0,25 | +/-0,010 | 2,01-2,50 | +/-0,25 | +/-0,010 |
| 18,00-19,99 | +/-0,30 | +/-0,012 | 2,51-3,00 | +/-0,30 | +/-0,012 |
| 20,00-23,99 | +/-0,35 | +/-0,014 | 3,01-3,50 | +/-0,35 | +/-0,014 |
| 24,00-29,99 | +/-0,40 | +/-0,016 | 3,51-4,00 | +/-0,40 | +/-0,016 |
| ect. | | | ect. | | |

Other tolerances available upon request

| Roughness Results | | | | | | |
|-------------------|---------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Sample ID | Profile | R _a (nm) | R _q (nm) | R _p (nm) | R _v (nm) | R _t (nm) |
| 451HP | 1" | 70 | 91 | 195 | 254 | 3662 |
| | 0.01" | 62 | 81 | 185 | 266 | 540 |
| 950HP plus | 1" | 55 | 68 | 136 | 164 | 522 |
| | 0.01" | 46 | 59 | 151 | 121 | 347 |
| AP-231SH | 1" | 98 | 122 | 220 | 335 | 970 |
| | 0.01" | 113 | 145 | 286 | 358 | 732 |
| PFA 450 HP tubing | 1" | 0.114 | 0.148 | 0.454 | 0.507 | 2.834 |
| | 0.01" | 0.091 | 0.115 | 0.288 | 0.288 | 05.28 |

Optinova tubing in all 4 materials are tested according to SEMI C90.
Data available upon request

Extraction values from SEMI F57-0622 testing (unit mikrogram/m2)

F57-0622 (F40-0621E: 85°C,7d)

Leachables in UPW

| Elements | Limit F57 | AP-231SH | 950HP plus | 451 HP | 450 HP |
|-----------|-----------|----------|------------|--------|--------|
| TOC | ≤40000 | 260 | 730 | 580 | 580 |
| Bromide | ≤100 | * | * | * | * |
| Chloride | ≤100 | * | * | 5 | * |
| Fluoride | ≤20000 | 1700 | 2300 | 1500 | 2500 |
| Nitrate | ≤100 | * | * | 26 | 21 |
| Nitrite | ≤100 | 8 | 17 | * | * |
| Phosphate | ≤100 | * | * | * | * |
| Sulfate | ≤100 | * | * | 16 | * |
| Aluminum | ≤5 | 0.37 | 0.18 | 0.06 | 0.2 |
| Antimony | ≤2 | * | * | * | * |
| Arsenic | ≤2 | * | * | * | * |
| Barium | ≤15 | * | * | * | 0.016 |
| Beryllium | N/A | N/A | N/A | N/A | N/A |
| Bismuth | N/A | * | * | * | * |
| Boron | ≤30 | 3.3 | 2.9 | 3.3 | 2.9 |
| Cadmium | ≤2 | * | * | * | * |
| Calcium | ≤10 | 0.42 | 0.40 | 0.10 | 0.22 |
| Chromium | ≤1 | 0.29 | 0.044 | 0.095 | 0.30 |
| Cobalt | N/A | 0.56 | 0.06 | 0.10 | 0.3 |
| Copper | ≤10 | 1.7 | 0.87 | 0.14 | 0.45 |
| Gallium | N/A | * | * | * | * |
| Germanium | N/A | * | * | * | * |
| Gold | N/A | N/A | N/A | N/A | N/A |

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Extraction values from SEMI F57-0622 testing (unit mikrogram/m2)

F57-0622 (F40-0621E: 85°C,7d)

Leachables in UPW

| Elements | Limit F57 | AP-231SH | 950HP plus | 451 HP | 450 HP |
|------------|-----------|----------|------------|--------|--------|
| Iron | ≤5 | 0.95 | 0.48 | 0.87 | 0.64 |
| Lead | ≤1 | 0.009 | * | * | 0.006 |
| Lithium | ≤2 | * | * | * | * |
| Magnesium | ≤2 | 0.04 | 0.02 | * | 0.03 |
| Manganese | ≤5 | 0.06 | * | 0.03 | 0.10 |
| Mercury | N/A | * | * | * | * |
| Molybdenum | N/A | 0.12 | 0.1 | 0.13 | 0.17 |
| Nickel | ≤1 | 2.9 | 1.3 | 1.7 | 3.5 |
| Potassium | ≤10 | 0.16 | * | * | 0.24 |
| Silver | N/A | * | * | * | * |
| Sodium | ≤10 | 0.16 | 0.07 | 0.08 | 0.11 |
| Strontium | ≤0.5 | * | * | * | * |
| Tin | ≤2 | * | 0.06 | * | 0.10 |
| Titanium | ≤2 | * | * | * | * |
| Tungsten | N/A | * | * | * | * |
| Vanadium | ≤2 | * | * | * | * |
| Zinc | ≤5 | 0.58 | 0.40 | 0.06 | 0.17 |
| Zirconium | N/A | N/A | N/A | N/A | N/A |

Values with * = non-detectable
Tested by Balazs Lab (AirLiquide), Fremont (CA), USA

| PFA | Property | Specification | Unit | | |
|-------------------------|---|------------------|----------------|--------------------|--------|
| General | Continuous service temperature | Maximum | °C | 260 | |
| | | | °F | 500 | |
| | Chemical resistance | | - | Excellent | |
| | Specific gravity | D792 | - | 2.15 | |
| | Transparency | - | - | Excellent | |
| | Sterialization | | | Eto, Steam | |
| Environmental | Water absorption | D570 | % | < 0.03 | |
| | Weather resistance | - | - | Excellent | |
| | Oxygene index | D2863 | % | > 95 | |
| | Flammability | UL 94 | - | V-0 | |
| Thermal | Melting point | | °C | 305 | |
| | | | °F | 581 | |
| | Thermal conductivity | C177 | BTU/(h.ft. °F) | 1.3 | |
| | Deflection temperature 66 psi | D648 | °C | | 74 |
| | | | | | 48 |
| | Deflection temperature 264 psi | D648 | °F | | 166 |
| | | | | | 118 |
| | Mechanical | Tensile strength | D1708, D638 | psi | 4 000 |
| Elongation | | D1708, D638 | % | 300 | |
| Compressive strength | | D695 | psi | 2 200 | |
| Impact strength | | D256 (+23°C) | Ft-Lb/in | No Break | |
| Flexural Modulus | | D790 (+23°C) | psi | 100 000 | |
| Tensile Modulus | | D638 | psi | 40 000 | |
| Hardness | | D2240 | - | D-60 | |
| Coefficient of friction | | - | - | 0.21 | |
| Electrical | Dielectric constant | D150 (103 Hz) | - | 2.1 | |
| | | | D150 (106 Hz) | - | 2.1 |
| | Dielectric dissipation factor | D150 (103 Hz) | - | 0.0002 | |
| | | | D150 (106 Hz) | - | 0.0003 |
| | Dielectric strength (short term) 10 mils film | D149 | Volt/mil | 2 000 | |
| | Volume resistivity | D257 | Ohm • cm | > 10 ¹⁸ | |

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