Equipment Reviews

Furutech FI-50 NCF Series Power Connectors and FP-TCS31 Alpha PC-Triple C Bulk Power Cord

Details Written by Howard Kneller Created: 15 June 2017

It's been almost a decade since my last review of Furutech products: their G-314AG-18 and Absolute Power-18 power cords. I noted then that Furutech tries to squeeze every last ounce of performance from its products, not only through the use of innovative technologies, but also with obsessive devotion to detail and build quality. It seems that no improvement in sound quality is too small to be worth achieving, and no product can be overbuilt.

The subjects of this review, the FI-50 NCF Series power connectors (\$385 USD each, male or female) and FP-TCS31 Alpha PC-Triple C bulk power cord (\$157/meter), demonstrate that, over the last ten years, things at Furutech have not changed. These products contain new technologies, and the attention to detail that Furutech has lavished on their design, materials, and construction is second to none.



So that I could run comparisons, Furutech sent over its mid-level power connector, the FI-28 (\$139 each, male or female), and an extra length of Alpha PC-Triple C bulk power cord. I was curious to hear how the Furutech cords compared not only with each other and to my Welborne Labs DIY cord, but also with several finished cords that I have. At the \$1000 price point (the approximate cost of building a cord with the FI-50 connectors and Alpha PC-Triple C cord), there's no shortage of excellent finished cords out there, including some from Furutech themselves.

FI-50 NCF: the Patek Phillipe of power connectors

The FI-50 NCF is Furutech's top-dog power connector. Highly polished and jewel-like, its heavily damped body is multi-layered. The exterior layers are made of nonmagnetic stainless steel and silver-plated carbon fiber. The interior layers are of nylon, fiberglass, and acetal copolymer, the last a strong, stiff, semicrystalline thermoplastic that acts as a damper.

The connector's body is further damped through the use of two "active" materials: nano-sized polycrystalline ferroelectric ceramic particles that Furutech calls Nano Crystal² Formula (NCF), and powdered carbon. According to Furutech, through a piezoelectric process, NCF generates negative, staticeliminating ions and converts thermal energy into far infrared radiation (FIR). Powdered carbon, the company states, possesses thermal-conductive damping properties.

Also, within the connectors is a patented Earth/Ground Jumper System that Furutech says eliminates electromagnetic interference (EMI) around the connector's housing and screws. According to Furutech, current flowing through a power cord creates a large electromagnetic field that, in 120V AC systems, expands and collapses 60 times per second. This large field is interrupted by multiple, smaller screw-based fields, resulting in noise and distortion. The jumper system star-grounds the connectors' housings and screws via a Floating Field Damper Bridge that spans the connector's interiors.

In some Furutech connecters, the Damper Bridge and/or small copper tabs leading to the bridge are visible on the exterior. On the FI-50 NCF, only the copper tabs are visible. Furutech states that one way to ensure that the connectors are genuine Furutech products, not counterfeits, is to look for this grounding system.

At the inside rear of the connector is a large, stainless-steel clamp that suppresses resonances by securely gripping the uncrimped portion of the cord. Unlike most power-connector clamps, this has rounded pressure plates designed to improve grip and more effectively damp resonances. The cord's three conductors, one each for hot, neutral, and ground, are secured to the connector's poles with smaller clamps deeper within the connector's body.

Finally, the connector's housing screws, and the male connector's pins of oxygen-free copper (OFC), are rhodium-plated using a propriety process. High-purity copper is very conductive but relatively soft and malleable, making it unfit for use as pins. Many pins are therefore made from harder but relatively poor-conducting metals, such as brass or phosphor bronze.

Rhodium is a hard, silvery-white, noncorrosive metallic element that's primarily used in the manufacture of automotive catalytic converters and as an alloying agent with other metals, such as platinum and palladium. Although expensive, rhodium is more conductive than brass or phosphor bronze. These

qualities make it an excellent material for connector pins.

All of the FI-50's metal parts, including its pins, are treated with Furutech's two-stage Alpha cryogenic and ring-demagnetization processes. The cryogenic process uses nitrogen or helium to cool the parts to between -321°F and -418°F (-196°C and -250°C). This, Furutech states, tightly binds and stabilizes the metals' molecules, thus improving conductivity.

Furutech licenses the ring demagnetization process from Sekiguchi Machine Sales Co. Ltd., parent company of Acoustic Revive. This demagnetizes the parts to a time-controlled peak, then does it again in a reverse-attenuation cycle. Furutech states that, unlike competing procedures, this one *completely* demagnetizes the parts.

Furutech claims that no other manufacturer goes to the expense and effort that they do to develop and produce its power connectors. The company is apparently not alone in this assessment -- its connectors are used by many other makers of audiophile power cords, such as Audience, Enklein, Purist Audio Design, and Siltech.

FP-TCS31 Alpha PC-Triple C bulk power cord: easy being green

Three 2.5mm-thick conductors run through the center of Furutech's FP-TCS31 Alpha PC-Triple C power cord. Each conductor consists of 45 twisted strands of solid, 0.32mm-thick, 99.996% OFC. Understanding the PC-Triple C designation requires a bit of historical exposition.

Japanese makers of high-end audio cables such as Acoustic Revive, Harmonix, Oyaide, and Furutech previously used copper wire manufactured by Furukawa Electric Co., Ltd., Japan's largest producer of cables for the country's power-transmission and telecommunications industries. Furukawa used a forging process called Pure Crystal (or sometimes Purity Copper) Ohno Continuous Casting (PCOCC), based on a technology invented in 1986 by Atsumi Ohno, a professor at Japan's Chiba Institute of Technology. The PCOCC process of making wire used casting rather than the traditional drawing method. The copper's purity exceeded 99.9997% and had elongated internal crystals, both said to facilitate electrical conductivity. Furukawa used this process to make its own copper audio cables until 2000; after that, it sold PCOCC wire only to audio manufacturers, on an OEM basis.

In 2013, Furukawa announced that it was ceasing production of PCOCC wire due to weak demand. Although, at the time, several other types of audiophile-grade copper wire were being manufactured in Japan, including by Acrolink (AcroJapan) and Mogami, this decision affected many domestic manufacturers.

More recently, a Furukawa subsidiary, Fine Chemicals & Materials (FMC), developed a new forging process called PC-Triple C that is claimed to be superior even to PCOCC. PC-Triple C forging uses a repeated metal-folding technique said to be similar to that used in the manufacture of the *katana* -- ancient Japanese samurai swords. Extreme pressure is applied to high-purity OFC at precise angles, to "fold" the copper tens of thousands of times, removing air from it and reducing its volume by as much as 70%. This is said to cause the copper's crystals to elongate, horizontally align, and become better connected, which in turn is

said to minimize the diode effect -- the uncontrolled hopping of electrons between successive crystals. The copper then undergoes a time- and temperature-controlled annealing process that's said to further fuse the crystals.



The result of the PC-Triple C process is copper that's "only" 99.996% pure, compared to PCOCC's purity of 99.9997%. However, the structure of the former's crystals, which in some instances may be even more important to sound quality than purity, is said by many to be vastly superior to that created through any other process, including PCOCC. PC-Triple C copper wire is now used by many Japanese cable makers -- including, unsurprisingly, Furutech, in the Alpha PC-Triple C power cord.

Each of the Alpha PC-Triple C power cord's three finished conductors is surrounded by a flexible insulator of audio-grade PVC: green with a yellow stripe, brown, or blue. The conductors and insulators are in turn wrapped in a flexible black inner sheath of audio-grade PVC that incorporates carbon damping particles. This sheath is surrounded by a wire-braided shield of OFC, 9 x 24-strand, 0.12mm thick, this in turn covered with a dark green outer jacket of flexible audio-grade PVC.

Have wire crimper and screwdriver, will travel

I cannot overemphasize the seriousness of the FI-50 NCF's and Alpha PC-Triple C's materials and build quality. I got the strong feeling that anyone paying the retail prices would be getting something well-made and luxurious for the money.

Stripping the Alpha PC-Triple C's many thick layers down to the bare conductors is a bit of work, but it lets you appreciate the cord's robustness. Once the conductors were exposed, I opened the FI-50 NCF connectors by removing their screws.

At that point, my DIY instincts counseled me to line the connectors' insides with fo.Q, a very effective Japanese anti-resonance tape used not only by audiophiles, but also by audiophile manufacturers in numerous products. In fact, Furutech applies the stuff to its 102-D and 102-S AC outlet covers. I was also tempted to apply some contact enhancer to the connectors' contact points. Furutech's own Nano liquid, which uses gold and silver microparticles suspended in squalene oil, would be perfect. However, I was assembling these cords in order to review them *as manufactured*, so I resisted the temptation to tweak and went back to work.

The rest of the setup consisted merely of placing the Alpha PC-Triple C cord into the FI-50 NCFs' rear ends, where the former is secured by the large clamps, and then connecting the three conductors to the connectors' poles via the small clamps -- no soldering required. Not wanting to blow anything up (or worse), I took care to match up the poles of both the male and female connectors with the properly colored conductors. I then repeated the process for the Alpha PC-Triple C and FI-28 cord.

All in all, assembling the two 5'-long power cords wasn't difficult, and could be done by anyone who can wield a wire stripper and a screwdriver.

Power cords are devilishly difficult to break in, and the Furutechs were no exception. I ran them for hundreds of hours before I was comfortable that their performance had stabilized. I used them in various places in my system, but primarily with my Exoteric K-01X SACD/CD player and Esoteric Grandioso C1 preamp.

Sometimes clothes don't make the man, but conductive pins always make the power cord

Furutech's FI-50 NCF/Alpha PC-Triple C power cord proved an exceptional performer with a unique personality. First, it sounded particularly smooth, liquid, and clean. Take, for example, "Roundabout," from Yes's *Fragile* (24-bit/196kHz FLAC, Atlantic/Rhino). The famous sounds that precede and are interspersed among Steve Howe's guitar notes are, to say the least, difficult to identify. In fact, they're one of Rick Wakeman's piano notes, recorded and then reversed on a tape deck. What you hear on that track is the note swelling from faint to loud, swelling from decay to attack, as if it's rushing toward you. I have rarely, if ever, heard that note reproduced with such flow and liquidity as with the Furutech cord.

The Furutech's effortless sound remained consistent with everything I played, whether it was Ella Fitzgerald's impossibly silken voice in "Let's Do It (Let's Fall in Love)," from her *Sings the Cole Porter Songbook* (16/44.1 FLAC, Verve), or John Coltrane's sometimes turbulent but always beautiful saxophone on *A Love Supreme* (CD, Impulse! AS-77), or the deeply sensual and smooth tones of the Fender Rhodes electric piano in "Destiny," from Zero 7's *Simple Things* (16/44.1 FLAC, Palm Pictures).

Second, the Furutech cord had a somewhat cool sound that subtly attenuated frequencies below about 250Hz. This cord will not, for example, reveal the last degree of upper-bass woodiness in the sounds of clarinets and mandolins. But its unusually detailed, extended, and refined treble will beautifully reproduce the fleetingly high harmonic "edge" emanating from the clarinet's tone chamber, and accurately convey the brittle nature of upper-midband mandolin-string plucks. These are things that not every power cord can do.



One extreme example of the Furutech's subtle high-frequency bias was audible with Keith Jarrett's June 1, 1981, solo performance at Munich's Herkulessaal (Hercules Hall), from his *Concerts Bregenz München* (16/44.1 FLAC, ECM). In Part II of this concert, Jarrett embarks on an epic improvisation, but at one point apparently finds himself artistically cornered. He repeatedly strikes three notes and their neighboring tones in the piano's highest registers. He panics, frantically searching for a way out of the thin, metallic, sonically unpleasant place in which he's found himself. Groaning in frustration in a way that can be compared only to the equally unorthodox cries of pianist Glenn Gould, Jarrett furiously stomps his foot on the floor and strikes the piano's body with one hand, until his other hand secures a path down to the instrument's more musical ranges. The Furutech cord rendered the shrill high-frequency notes with jaw-dropping detail and extension, and accurately preserved their discordant tinniness. Rather than ameliorating these notes by blunting their sharp, trebly edges, the Furutech cord fully and cleanly delineated those edges.

Another example of the Furutech cord's upper-end predilections can be heard in organist Virgil Fox's recording of J.S. Bach's Fantasy in G Minor, BWV 542, from Fox's *The Bach Gamut* (16/44 FLAC, Reference), recorded in 1976 in St. Mary's Cathedral, in San Francisco, during one of Fox's "Heavy Organ" concerts. With the Furutech cord, the organ was leaner and less thickly layered than I'd heard it before. There seemed to be less output from my JL Audio Fathom f113 v2 subwoofers. However, what was there was uncommonly detailed and controlled, and less distorted. In fact, the notes were so free of bloat that, at 1:07 into the track, a previously unnoticed cough (Fox's?) was revealed at the right of the soundstage. And the organ's occasional high-frequency notes had never sounded so clean and elegant.

Aside from observations concerning the Furutech cord's sui generis take on musical rarities such as cacophonous high-end piano notes and subterranean pipe-organ displays, it checked off the boxes of the things I look for in a high-end power cord: transient impact, detail, image focus, and noise rejection. All

were present in spades.

In "Love in Mind," from Neil Young's *Live at Massey Hall 1971* (16/44.1 FLAC, Reprise), it's just Young and his piano. Showing off just how well recorded this album is, the Furutech cord solidly planted him at center stage rear. Save for a slight amount of analog tape hiss, Young was surrounded by an extraordinarily quiet background.

In Ondekoza's explosive percussion track "Fujiyama," on YG Acoustics' *Test CD II* (CD, YG Acoustics), the sounds of hard-hit drums seemed to emanate from a completely dark background, with subtle and beautifully reproduced skin reverberations. Also, in "Roundabout," the opening notes of Howe's 1953 Martin 00-18 acoustic guitar were large-bodied and extremely detailed.



Finally, the Furutech cord placed Ella Fitzgerald and John Coltrane solidly in my room, with detail, elegance, liquidity, and an abundance of toe-tapping flow and pace. And when the Jarrett track reached the point where he found his way back to the musical portion of the piano's keyboard in the Herkulessaal, the Furutech cord produced strikingly gorgeous and crystalline notes. This is not a cord that could ever be called clinical or analytical, nor did it favor quantitative detail retrieval over musicality.

The Furutech cord offers things -- clarity, detail, liquidity, refinement, upper-end extension -- that would greatly benefit many systems, tubed or solid-state, and particularly those with a neutral to warm sound. It might not be a good match for cool, strident-sounding systems. But in the latter case, I'd likely be looking to alter my mix of components before I tried to reveal more warmth and body through the addition of a power cord.

Going for gold

Curious about what I'd heard with the Furutech cord, I swapped it out for a Welborne Labs DYI cord that I long ago made for under \$100. The Welborne uses inexpensive Marinco connectors that, on the male end, have gold-plated pins. No matter what track I played, the Welborne cord sounded fatter, warmer, and more romantic in the middle and low frequencies than did the Furutech. It was also extremely forgiving.

However, on the Jarrett track, the Welborne cord lacked detail and rolled off the very highest frequencies. Not surprisingly for the money, it was also much less accurate and realistic than the Furutech.

I also swapped out the Furutech for several other cords with gold-plated pins. One was the utterly capable and much more expensive Synergistic Research Atmosphere Level 3 Digital (\$2995). The other, a Pangea Audio AC14, cost less than \$50, but listening to both cords confirmed the Furutech's cooler sonic signature.

Finally, I swapped out the Furutech cord with FI-50 connectors for the one I made with the FI-28 connectors. The FI-28s are solidly built, but they're not audio jewelry of the Harry Winston level, as the FI-50s are. Since both the FI-50s and FI-28s used the Alpha PC-Triple C cable, the difference in these power cords' constructions consisted solely in their connectors. Further, since the two models use the same rhodium-plated OFC pins, the differences between them come down to body construction. Unlike the FI-50s, whose male and female bodies comprise layers of stainless steel, silver-plated carbon-fiber, nylon, fiberglass, and acetal copolymer, the FI-28s' bodies are of nylon and fiberglass, with only a single active damping material: powdered carbon.

The FI-28s deserve their own review. Suffice it to say here that they retained the FI-50s' basic sonic signature, though the performance levels offered by the two conductors are far from identical. With the FI-28s, detail, soundstaging, focus, and even noise reduction were less impressive.

It's difficult to believe that the construction of a power connector's body could make such a difference in my system's sound, but it did. In high-end sound reproduction, *everything* counts.

Because it's exceptionally good

Why would someone go to the troubling of making a DIY power cord from the FI-50 NCF power connectors and FP-TCS31 Alpha PC-Triple C bulk power cable? The short answer is because such a cord would be exceptionally good. While perhaps not right for every system, that cord would work very well in most or many of them. Yes, you can buy finished Furutech cords that contain PC-Triple C copper conductors and and/or FI-50 connectors. However, I suspect that, if you do, you'll pay a lot more than if you'd made the cord yourself. Highly recommended.

... Howard Kneller

howardk@soundstagenetwork.com (mailto:howardk@soundstagenetwork.com)

Associated Equipment

- Amplifier -- Esoteric A-03
- Preamplifiers -- Esoteric C-02X and Esoteric Grandioso C1

- **Sources** -- Windows 10 desktop PC with JCAT USB Card and JCAT USB Isolator, running JPlay; Esoteric K-01X SACD/CD player, Stanford Research Perf 10 rubidium clock
- Other electronics -- JL Audio CR-1 active subwoofer crossover
- Speakers -- YG Acoustics Kipod II Signature
- Subwoofers -- JL Audio Fathom f113 v2 (2)
- Interconnects -- Synergistic Research Atmosphere Level 4
- Digital cables -- Synergistic Research Galileo LE USB, JPlay JCAT USB
- Speaker cables -- Synergistic Research Atmosphere Level 4
- **Power cords** -- Synergistic Research Atmosphere Level 3
- Power conditioners and distribution -- Synergistic Research PowerCell 12 UEF SE and QLS power strips
- Isolation devices -- Symposium Acoustics Osiris Ultimate and Standard racks, Symposium Acoustics Segue Platform, Synergistic Research Tranquility Bases, Silent Running Audio VR fp Isobase, Synergistic Research MIG 2.0s, Symposium Acoustics RollerBlock Series 2+ equipment support system
- **Room treatments and correction** -- Synergistic Research Acoustic Art System, Synergistic Research HFT and FEQ room treatments
- **Misc.** -- Synergistic Research Grounding Block, Mad Scientist Black Discus Audio System Enhancer, WA-Quantum Quantum-Sound-Animator, Hi Fidelity MC-0.5 Magnetic Wave Guides

Furutech FI-50 NCF Series Power Connectors Price: \$385 USD each (male or female). Furutech FP-TCS31 Alpha PC-Triple C Bulk Power Cord Price: \$157 USD per meter. Warranty: One year parts and labor.

Furutech Co., Ltd. Furutech Bldg. 3-9-1 Togoshi, Shinagawa-Ku Tokyo 142-0041, Japan Phone: +81 (0)3-6451-3941

Website: www.furutech.com (http://www.furutech.com)

North American distributor: Scot Markwell Elite Audio Video Distribution PO Box 93896 Los Angeles, CA 90093 Phone: (800) 457-2577 x22, (323) 466-9694 x22

E-mail: <u>scot.markwell@eliteavdist.com (mailto:scot.markwell@eliteavdist.com)</u> Website: <u>www.eliteavdist.com (http://www.eliteavdist.com)</u>