TRANZ LUBRICANTS
FOR EXTREME SERVICE
INDUSTRY EXCELLENCE SINCE 1951

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# TRANZ Kinetic Energy Control

From the Energy Transfer & Control series

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# TRANZ Q21-1 to Q21-7

## Kinetic Energy Control Fluids

### PERFORMANCE AREA

Fluid Damping - Low to Medium Shear requirements in Industrial & Precision applications, such as in instrument assemblies, gyro compasses, gimbals, Viscoelastic Media - for vehicle fluid drives & clutches, etc. [* For High Shear applications - Viscostatic & Liquid Spring Suspensions, see Q20 Series]

The range of TRANZ Q Series Energy Transfer Control compounds covers a wide range of fluid, semi-fluid and compound forms developed to enable the engineering influence of Light, Electrical, Thermal, Acoustic and Kinetic (Mechanical) energy, within the capacity of the film dimensions.

These widely differing products include the TRANZ Q21 Subseries Damping Fluids. These fluids are purpose-driven synthetic organo-metallic fluid polymers developed with a wide range of molecular weights yet retaining the enhancement of very narrow structural (i.e. in the linear molecular structure) configuration which supports their outstanding capacity in fluid damping. By their specific design these liquid polymers can store diverse impact or supercritical shearing energy inputs by smoothly accepting winding and then compression of the extremely long polymer chain length and by winding through the helical conformation of their molecules.

Smooth assumption and storage of differing forms of input energy input is accompanied by little energy loss - some modest heat only - enabling an equally smooth energy release, over time, eventually, or when the power input is interrupted or terminated. The characteristics of this energy absorption and release are such that the cycle is perceived at the very least, as a damping effect and at best, complete force suppression through elimination of peaks.

The inherent characteristics of the TRANZ Q21 Series, Damping and Viscoelastic fluids, include a high dielectric strength, predictable compressibility, a very low rate of thermal expansion and low vapour pressure. These enable secure fluid containment in suitably designed, closed, but not pressure sealed, reservoir systems of appropriate strength and temperature tolerance, but avoiding any metals of construction which are polymer-catalytic in metallic form, especially such as pure copper, tin or zinc. The heat-life of the TRANZ Q21 series in closed systems that have been purged of air and placed under nitrogen blanket is more than 200 % of systems open to the air.

The inherent compressibility means that power is absorbed when an attempt is made to pump these fluids by means of centrifugal impellers. Slow moving positive displacement pumps give best results.

## DEFENCE STANDARD & CERTIFIED GRADES

All the Q21 Series and certain selected grades can meet / or already are, Specified in the Australian Defence Command's DEFSTAN series. These products are required to meet the stringent Compliance Release Specifications established in an historical series of ASTM, MIL, SAE-AMS Qualification documents. When these are required they are separately ordered from our TRANZ DA Series.

# KINETIC ENERGY CONTROL FLUIDS

## Mechanical-functional, damping, visco-static and visco-elastic fluids

Fluid Damping - Low to Medium Shear requirements in Industrial & Precision applications,
such as in instrument assemblies, gyro compasses, gimbals, Viscoelastic Media - for vehicle fluid drives & clutches, etc.
Working Temperature -40°C to +220 °C
[Note: For High Shear applications - Viscostatic & Liquid Spring Suspensions, see TRANZ Q20 Series]

| TRANZ Q21 - Q21-7 ETC Series | Q21-1 | Q21-2 | Q21-3 | Q21-4 | Q21-5 | Q21-6 | Q21-7 | Q21-8 |
|---|---|---|---|---|---|---|---|---|
| **Viscosity, cps.** | 50-90 | 300-400 | 1,000 | 10,000 | 25,000 | 40,000 | 60,000 | 100,000 |
| **Flash Point, °C.** | 272 | 325 | 330 | 350 | 365 | 365 | 368 | 370 |
| **Therm. Exp 25/100°C** | $1.04x10^{-3}$ | $9.55x10^{-4}$ | ←----------$9.55x10^{-4}$ ----------> | | | | | |

| TYPICAL PROPERTIES COMMON TO ALL GRADES | |
|---|---|
| **Appearance** | Crystal clear, water white. |
| **Working Temp Range, °C** | -40 to +220 |
| **Viscosity./ Temperature Coefficient** | 0.62 |
| **Specific Gravity, @ 25 °C** | 0.96 |
| **Vapour Pressure, @ 200 C, mBar,** | $1.35 \times 10^{-2}$ |
| **Specific Heat, J/gm.K.,** | 1.46 |
| **Thermal Conductivity, W/m. K.,** | 0.16 |
| **PACKAGING** | 500 ml Jars; 5 L. lined, cans; 20 & 60 L. lined, steel containers |

| TRANZ Q26 | "*Slip and Grip*" Cable Drawing lubricant<br>HAULING UNDERGROUND CABLES<br><br>Through every type of conduit with unique damping and "Stick-Slip" effect<br>Visco-elastic Gel Lubricant |
|---|---|

## TRANZ Q26 "*Slip and Grip*" Cable Drawing lubricant

Performance Area: Biodegradable water-dispersible, inert, viscoelastic lubricant for controlled drawing of all sizes of Power & Communication Cables through PVC & Polyethylene plastic, reinforced fiber, concrete and ductile iron piping and conduit.

FIELD PERFORMANCE has been developing commercial applications of products resulting from its Principal's studies in applied Tribophysics in the manufacture of high performance functional compounds and specialty lubricants for a wide range of manufacturing and service industries since 1951. Among many, the present range of TRANZ Q Series Energy Transfer Control compounds covers a wide range of performance materials developed to enable the influence of Light, Electrical, Thermal, Acoustic and Kinetic (Mechanical) energy, within the capacity of the films.

These widely differing products include the TRANZ Q20-Q29 Series, a range of highly active Damping and Viscoelastic fluids and compounds. These individual materials are purpose-driven synthetic preparations developed with a wide range of molecular weights yet retaining the enhancement of narrow structural (i.e. linear) configuration. By their specific design these fluid polymer materials can store diverse impact or supercritical energy inputs by smoothly accepting winding and then compression of the immensely long helices of their molecules. The energy "storage" is accompanied by little energy loss, enabling a smooth energy release, over time, eventually, or when the power input is interrupted or terminated. The characteristics of this energy absorption and release are such that the cycle is perceived as complete peak "damping", or at least, as a damping effect and over the years many significant industrial applications have been developed.

In the course of this work, a series of "Chemical Tools" (TM) for use in Power Generation and Distribution under our TRANZ brand, had been developed during the 1960's. Following collaboration with Power Authorities, the need was revealed for a versatile lubricant, able to draw the lightest wiring through plastic and metal conduit, as well as *slip* the very high loading imposed by heavy power cables during extended draws through metal, high polymer, concrete and metal piping and forms. Further, very extended stability data from trials contact with all known insulating materials and conductors to generate real-time data, was required to verify the critical "nil effects", on all known plastic and metal sheathing for conductors and later, on the new polymer developments including sheathed optic fiber bundles.

### History:

Following five years of close collaboration with the principal power authorities firstly in Western Sydney then Newcastle and Warringah, plus extended cooperation with all the manufacturers of cable sheathing materials and the conduits themselves, TRANZ Q26 was brought to the market in 1967 under its Developmental number 1362 and offered for field trials. The results of these trials were critically appraised over the next seven years and so in 1974, this carefully developed Cable Slipping Lubricant, TRANZ 1362, was released for general use and twenty years later, renumbered TRANZ Q26 and brought to the full sales range.

After more than 30 years of successful service in every kind of application including the drawing of the largest cables made, the Development Product TRANZ 1362, was placed in our Sales Range as TRANZ Q26, a member of the TRANZ Q Series for Energy Transfer and Control. Since its inception, proof abounds of the quite exceptional load carrying capacity and point loading capabilities of the Q26 product in long and complex draws of all cable sizes including up to 150 mm diameter.

But, most importantly, sophisticated development of the Q26 Compound's internal structuring, has enabled this excellent lubricity to be accompanied by a unique control characteristic which means that TRANZ Q26 exhibits reproducible control simply from varying the power input requirement over the draw.

This characteristic was resolved during the extensive Industry consultation phase, when the original 1362 compound was being designed. Here, repeated warnings about the problems of over-lubrication, were sounded by field crews. These applied to the perils experienced from spontaneous disgorgement of lubricated cable after being drawn into conduit lying in steep country, upon detachment of restraint from the winch.

This dangerous phenomena, from the unrestrained and unlimited "over-lubrication" effects, inherent to all simple lubricants, was the incentive for FIELD PERFORMANCE to devise the first shear-responsive and dependent, cable drawing lubricant compound, exhibiting what we call the "stick-slip" effect. This characteristic places precise control of the draw rate in the hands of the winch crews and maintains TRANZ Q26 as unique among products offered for this role.

The "stick-slip" structure means that when TRANZ Q26 is used to lubricate cable, the winch operator can initiate power induced slip in the compound, (as a consequence of a designed instantaneous reduction in net structural internal shear friction, designed within the compound), the moment the cable moves at the commencement of the draw. But when draw rate (and hence internal shear), is reduced or terminated, the lubricant film on the cable undergoes a reversely disproportional increase in internal friction, so that lubricity of the cable is sharply reduced and therefore remaining under control as movement slows.

Further more since TRANZ Q26 is a biphasic compound and not just a simple gum-in-water solution with all the disadvantages of such, its strong oleophillic phase ensures that it evenly wets and clings substantively to every type of cable insulation, no matter how oily or waxy the surface and spreads readily along the conduits where the cable bears on them. Simple, water solution lubricants, cannot even wet, let alone level out on, the extremely water repellent surface on typical high polymer plastic or other organics sheathing or coatings.

These exceptional features of TRANZ Q26 result in adherent, non-drip retention of the lubricant film on the cable, showing benefits, both from economy in use and environmental responsibility through a major reduction in soil intrusion from absence of dripping. Even if accidental spills into soil or water occur, the TRANZ Q26 imposes an almost negligible bio-burden and is rapidly and totally digestible by soil and water borne organisms.

After more than 30 years of Power Industry use, the only changes needed in TRANZ Q26 over the last 10 years has been the necessary progressive determinations and refinement in raw materials to ensure the entire lubricant remains biodegradable, together with extended trialing on all the new types of insulation materials and cables, including the new sheathed optical fiber bundles.