TRANZ LUBRICANTS
FOR EXTREME SERVICE
INDUSTRY EXCELLENCE SINCE 1951

RESEARCH
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DEVELOPMENT
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TRANZ A400 Series extreme interfacial lubricants

Service in assemblies from very low to ultra-high temps
interfacial lubricnts between metals / rubbers / plastics in any combination

TRANZ LUBRICANTS is a Division of
FIELD PERFORMANCE AUSTRALIA
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TRANZ A400 Series

High performance greases based on synthetic, polymerics inc. alkylsiloxanes, co-silicone & copolyfluorocarbons, misc. synthetics, with and without metallic & non-metallic EP. Some Food Grade.

Service in assemblies for metal / metal and interfacials between metals / rubbers / plastics work in contact, in low, very low, high and ultra-high temps.

A420	Specifically Elastomer Seals
A425	Ultra-High Performance common seals lubricant – engineering Applications Specifically Developed for Aluminum electrolytic smelter cells, for lubrication of pneumatic crustbreaker cylinders seals. Suitable for elastomer, thermosetting plastic, ceramic, or combinations of seals

Optimising alumina feeders in aluminium smelting pots **J. P. Kissane**, *University of Wollongong*
http://ro.uow.edu.au/theses/1589/

TRANZ A400 Series

Description	High performance greases based on synthetic, polymerics inc. alkylsiloxanes, co-silicone & copolyfluorocarbons, misc. synthetics, with and without metallic & non-metallic EP. Some Food Grade.			
TYPICAL PROPERTIES	**A 410**	**A 414**	**A 420**	**A 425** (see detailed A425 table)
In service since	1986	1988	1990	1992
DEF STAN. Specified	No	No	XG-315 Aircraft	XG-315 Aircraft
Service Temp. Range °C	-45 to +100	-30 to +175	-20 to +200	-20 to +215
Short Term Peak °C	165	195	215	235
Appearance	Pale beige	Pale Green	White	White
Std. Consistencies, NLGI	1-2	2 & 3	2	2
Approx. Hrs. Life @ normal service temp.	20,000	30,000	50,000 - >65,000	60,000 - >65,000
Elec. Resistivity Ohm/cm	18.5	17.5	21.5	25.5
'Speed' Factor	High	Good	Good	Good
Mechanical, Metal on Metal	Fair	Excellent	Good	Good
Elastomer / Plastics contact?	←----------Suitable for all except Silicone Rubbers & LDPE threads---------->			
Suit Elastomer Seals?	Yes	Yes	Yes	Yes
PTFE Seals?	No *1	No *1	No *1	Yes
Suit Ceramic	Yes	Care	Care	Yes
Copper Alloys inhibited? *2	Yes	Yes	No	No
EP Capability *	No	Yes	Yes	Yes
EP Capability *2	No	Yes	Fair	Yes

Notes *1 Refers to the restricted ability of other polymers to 'wet' fluoropolymers
***2 Where required, certain of these properties can be supplemented to meet specific requirements.**

Packaging	Cartons containing 20 X 250gm. screw top jars; cartons containing 4 X 5 Kg. tins; and 20Kg. steel open head pails. Enquiries are invited concerning availability or development of alternative packaging forms, both for OEM metering and maintenance.

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TRANZ® Hypalube A425

Ultra-High Performance Seals Lubricant - Engineering Applications
Specifically Developed for Lubrication of Pneumatic Cylinder seals

TRANZ Lubricants, a division of Field Performance, has had a long and successful history in the development of outstandingly superior lubricants in many highly specialized and extreme performance applications, oftentimes, where no other product has been able to serve.

No product characterizes Field Performance capacity more than our TRANZ Hypalube A425 lubricant, developed in collaboration with aluminium smelting industry technicians. TRANZ A425 evolved in 1992 from our continuous product development over a decade in which Australia's numerous smelter groups established and expanded their pot lines with ever higher performance envelopes set for the pneumatic cylinders operating their integrated feeders. Made for cell 'lifetime' lubrication of the thousands of both rubber and composite lip and rod seals in the pneumatic cylinders of integrated feeders working at extremely high temperatures on electrolytic cells, since 1991 TRANZ A425 has shown outstanding service in some of the World's most extreme smelting environments, TRANZ A425 has a proven service cell lifetime of a minimum 5, and up to 7 plus years crustbreaker pneumatic cylinder seals service life. TRANZ A425 has a high electrical insulation value, a major advantage in the highly charged environment of electrolytic cells, in contrast with the undesirable conductance of competitive products based on carbon black graphitic carbon and metal salts like molybdenum disulphide.

Exceptionally rigorous independent laboratory testing in Melbourne Victoria commissioned by one of Australia's largest smelters, together with unceasing side-by-side operational comparison, has service-proven TRANZA425 as the absolute World's Best.

PNEUMATICS

Rock-solid reliability in the most extreme smelting environments in the world, establishes TRANZ A425 as State of the Art, especially the completely proven 7 plus years service life, which represents a ‘lifetime’ of the cylinder seals, in crust-breakers exposed to the extremity of conditions under which no other compound from the World's best, has been able to serve.

Whether pneumatic cylinder seals are elastomer, thermosetting plastic, ceramic, or combinations of these, TRANZ Hypalube A425 lubricant compound is ready for service, from environmental temperatures from -40°C, up through every ambient and on, to continuous temperatures as high as 215°C with short term (10 to12 Hrs.) overload capacity of 235°C

CYLINDER SEALS

The data listed here refers to the lubrication of piston and rod seals in high pressure pneumatic equipment, but this capability could extend to any plant in which seals play a vital part.

The single most important aspect of products for service in this business area, is the absolute necessity of the lubricant having proven zero effect on the dimensional stability, tensiles and modulus, of the full range of organic and inorganic elastomers and composites used in seals construction, plus zero reactivity with all the associated materials including metals, ceramics and plastics that are found in modern seal assemblies. Reliable performance under these conditions cannot ever be theorized. It requires lengthy and detailed stability study plus extensive service exposure. In this respect TRANZ offers compounds that have withstood the most critical and far ranging contact stability testing, trials and full service since 1988.

Selection Criteria:

The primary confirmation criteria for selecting the TRANZ A425 product is the full operating temperature envelope. When assessing service criteria, it is imperative to know with accuracy both the base and the peak temperature to which the seals will ever be exposed as well as the normal service range, since these figures alone confirm the suitability of A425.

See table next page

A425

MIL Spec. Compliances Meets Australian Defence Forces, DEFSTAN 91-56, Nato G-394 & XG-315, cited as Support Command Compliance, as per DEF-STAN (Aust) 206E	Grease, Aircraft, Pneumatic: Very Low / Very High Temperatures also meets MIL-G-25013 Grease, Aircraft, Pneumatic & MIL-G-8660C Grease, Aircraft, Elastomer Compatible
Appearance	White, opaque, glossy gel
Consistency, NLGI	2 (NLGI Grades 0, 1 & 3, can be made to order)
Service Temp. Range,	Normal, 0°C to +215°C
Low Temperature 'apparent fusion' point	- 65°C [polyfluorocarbon structure prevents A425 from 'freezing' in normal sense]
Short Term [up to 10 Hrs.] max. peak	235°C
Approx. Hrs. normal service life	approx. 65,000 @ normal service temp.
Elec. Resistivity Ohm/cm	25.5
Mechanical 'Speed' Factor	Good [but not sufficient for high speed factor ball bearings]
Mechanical, Metal on Metal contact	Good, especially in sliding & "chatter" applications
Elastomer / Plastics contact?	Suitable for all except Silicone Rubbers and on Low Density PE threads
Suit Elastomer Seals?	Yes, in all but Silicone, (causes slight swell) physicals are unimpaired.
Suit Composites / PTFE Seals?	Yes, originally developed specifically for PTFE and PTFE / composite, seals
Non-ferrous alloys contact? *	Inert to copper & zinc
EP Capability *	Yes
PACKAGING	Cartons containing 20 X 250 G. screw top jars; cartons containing 4 X 5 Kg. tins; and 20Kg. steel pails. Enquiries are invited concerning availability or development of alternative packaging forms and volumes, both for OEM metering and maintenance.

*** Where required, certain of these properties might be supplemented to meet customer's specific requirements, but this may be accompanied by changes in other properties, such as service temperatures.**

OPERATIONAL CONSIDERATIONS

Attention is drawn to the special circumstances in which previous operations on such as smelting plant encompass carry-over of the cylinder lubricant into valves and mufflers, resulting in apparent 'gumming' of the critical clearances in these components. In our experience this is usually caused by residues from a previously and possibly excessively used, incapable lubricant. Actual gelation occurs either from heat, especially wet heat from water entrained in the air supply - or contact with active metals such as copper and zinc, in the alloys of component construction, which become intensely catalytic under the influence of heat and compressed air. Further, in our experience, even the most fastidious temperature-stability testing of lubricants prior to service, invariably overlooks duplication of this intensely oxidation-active atmosphere from the high air pressures encountered.

In lesser lubricants, this pressure can super-oxidise by a factor of greater than 100 times over the atmosphere, initiating the rapid onset of chain-addition in the molecules of the lubricant base, up to the point of zero functionality at final gelation.

The polymeric structure of the fluid components of any lubricant, which may tolerate brief excursions of say 15 to 25 minutes at temperatures up to 10% over their continuous service range, will degrade steadily if left at these higher temperatures for even as little as an hour. Accordingly, thermal degradation of organic polymers at temperatures above their molecular disassociation points, is absolutely inescapable and only by the most carefully evaluated product development and working experience can there be even a respite from the inexorable destruction of all known organic lubricant bases under these conditions.

Therefore, in choosing TRANZ A425 for a critical or extreme service application it is significant to know that after accurate verification of the true operating conditions and verifying the service temperature range as being within our stated range that the compound will perform properly within this range.

In the properties listing in this document, reference is made to further aspects of performance in respect of the suitability of the grade for incidental metal-on-metal sliding lubrication. This characteristic is basically inherent to the polymer base, but we can possibly enhancement of any of these aspects for specific service tasks. Preparation of special grades for critical service outside our Specifications can be undertaken in collaboration with Customers.

APPLICATION

The TRANZ A420 AND A425 pneumatic cylinder seals lubricants are not designed to operate in the presence of other lubricants OR each other. Unless they are being applied to new components, which are clean and free of any transitory or residual films, then seals and their housings will need to be stripped and totally cleaned of absolutely any trace of previous lubricant, even of a different TRANZ grade, before lubricating with any of the above TRANZ products. Ignoring the imperative of this requirement exposes the entire subsequent assembly to the possibility of a seriously degraded performance. The perception has to be acquired that the scrupulous care and attention to enable the subsequent attainment of years of heat service, is so emphatically determining, that any compromise of the integrity in the system can bring it undone.

In fact, where applicable and or practical, the seals themselves should preferably be replaced, since minute surface absorption of a different previous lubricant into the micro pores of the seal, may severely compromise both lubricity and ultimately, the heat life also, of the chosen TRANZ product. The same applies to the necessity of ensuring absolutely, that the air supply is entirely free of compressor oil and water. Even as little as 2 ppm of oil may be enough to coagulate the fluoropolymer and even small traces of water, which will immediately form steam in the feeder, endangering the very "bright" ferrous working surfaces

An insufficient quantity of the chosen lubricant used to prepare the seals in the piston head and the rod seal housing, more than any other aspect, has the potential for influencing service life. Sufficient lubricant quantity must be provided to bed the seals and position the surplus to feed the seals during service. It is necessary to provide a 2-3 mm. ridge of lubricant in the cylinder barrel at each end of and in contact with, the piston head at the end of its stroke, to feed both the area at the end of the wear stroke and the piston head itself. The same reserve is also necessary for the rod seals. Any less will only reduce operational capacity. The limiting factor to this direction will of course be any such excess that may be transported to the air exhaust valves in a quantity that reduces their efficiency or at worst, blocks the muffler. This in turn would cause back pressure and a resulting change in speed in the piston plus a reduction in its effective work rating.

PACKAGING

Cartons containing 20 units X 250 G. screw top jars; cartons containing 4 units X 5 Kg. tins; and 20Kg. steel containers. Enquiries are invited concerning availability or development of alternative packaging forms, both for OEM metering and maintenance.

APPENDIX I - NOTES ON MATERIALS COMPATIBILITY

Engineers working under the jurisdiction of the Aluminum Smelter pot-room need to confirm compatibility of lubricants with the range of engineering materials used by component makers. In our direct experience, we have seen a large number of metals, rubbers and composites in service contact with TRANZ A425.

Generally, all engineering elastomers display unchanged stability in contact with the A425 gel, as have all composites tested so far. In this latter case, it is significant to note that due to the fluoro-organic structure of the A425 polymer, it's surface tension is similar to that of high MW fluoro-polymers like PTFE, enabling PTFE composites to be truly surface lubricated by the gel - a valuable effect without parallel in other lubricants we note which have been generally offered for this service.

Reactive contact from improperly formulated lubricants has been a serious problem for cylinder operations in smelters, where grease gelation on copper and zinc containing alloys, blocks exit valves and mufflers. Driven by a predictable super-oxidation occurring within highly compressed air at over 200°C, these materials catalyse rapid failure in improperly formulated lubricants. TRANZ A425 contains no oxidisable linkages, the benefits of which can be seen in the quite exceptional service lives attained in smelter operations NEVERTHELESS TRANZ A425 SHOULD NEVER BE USED IN CONTACT WITH PURE OXYGEN (refer to the TRANZ 500 Series when oxygen contact is required if in this situation)

Worldwide grease investigation for the pneumatic cylinder seals in smelting pot integrated feeders, a postscript:

Established in 1951, over the decades we have grown into a World Class manufacturer of some of the most highly specialised ultra-performance lubricants ever developed.

Often described as one of the few lubricant manufacturers who will tackle service problems when nothing else has worked, these TRANZ branded, functional lubricants for components made by major Industrial undertakings and Defence establishments and the manufacturing assets themselves, have often enabled over-stressed or under-designed plant, to continue operating and better still - even to out-perform, unrealistic performance objectives.

The depth of technical input to such problem solving has largely been enabled by our Founder's original collateral business, conducting one of the few operating consultancies in Applied and Forensic Tribophysics in the Western Pacific. Thus, time, opportunity and skills have enabled the evolution of many unique and outstanding products, especially with interfacial lubrication between mixed materials - Elastomers - Plastics - Metals & Composites, where component assemblies of mixed materials have to operate in contact with each other flawlessly and without loss of physicals in a stipulated expectation of 'lifetime service'.

Among these outstanding products, from the second half of the 1980's, our second generation TRANZ A410 & A414 compounds, made in our Sydney plant, had set the standard for high temperature service lubricating the rod and cylinder seals in thousands of the air cylinders operating integrated feeders being used in aluminium smelters in Australia, New Zealand North America and the Middle East.

In mid 1992, the Pot Room Superintendent at one of Australia's largest smelters, itself a subsidiary of one of the World's great aluminum companies, was empowered to initiate and conduct an investigation of integrated pot feeder pneumatic cylinder seal greases by and independent laboratory, CETEC – in Melbourne Victoria, Australia. After a preliminary consultation, Field Performance, the scientific developer and owner of TRANZ Lubricants, together with a Worldwide array of other lubricant makers, received orders from the smelter, for quantities of our 'best' existing and/or developmental, seals lubricants. Field nominated TRANZ A420 already with 5 year service on elastomer seals at another large Australian Smelter. Also, further development work for the investigation, resulted in TRANZ A425 as our third generation lubricant specifically made for the interfacial service with PTFE / glass composite seals nominated to be the subject of the report.

Eventually the Investigating Smelter advised that the study had been completed and among numerous operational aspects, CETEC reported that our two TRANZ greases performed as Best and Runner Up. Portions from the draft of the Investigators personal report from which proprietary information was removed, were released to Field and have been abridged and edited for appropriate distribution.

As at 2017, TRANZ A425 for PTFE/Composite Seals as the No.1 in the CETEC study, and TRANZ A420, for Elastomer Seals, as the No. 2, have now been in daily use for nearly 25 years at the Investigating smelter and 30 years at the first smelter respectively.

Pot room management at the investigating smelter advise that the use of TRANZ A425 together with the adoption of appropriate collateral cylinder and seals engineering modifications in many thousands of cylinders, resulted in the confirmed attainment within a >92 percentile, of the "5 Year Feeder" as a proven reality with very significant annual cost savings from reliable cylinder operations. With the further passage of time, the same combination has proven that regular attainment of a significant percentage of '7 year' feeder lives has been achieved.

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TRANZ™ A410 - A425 Series

High Performance Lubricants - Engineering Applications
Including Applicability to Pneumatic Cylinder Piston Lip & Rod Seals

TRANZ Performance Lubricants has had a long and successful history in the development of outstandingly superior lubricants in many highly specialized and extreme performance applications, oftentimes, where no other product has been able to serve.

No product range characterizes our skills more than the TRANZ A410 to A425 Series of compounds, developed in collaboration with the aluminium smelting industry. Made for 'lifetime' lubrication of the thousands of lip and rod seals in the pneumatic cylinders of integrated feeders working at extremely high temperatures on the electrolytic cells, these TRANZ compounds have proven their reliable operation, in service under the most extreme smelting environments in the world and to be completely inert to seal's physicals.

The TRANZ range emerged from our continuous product development over a decade in which Australia's smelter groups established and expanded their pot lines with ever higher performance required of the pneumatic cylinders operating integrated feeders.

The later series in the range, TRANZ A420, A425 & the latest developmental A440 are made for 'lifetime' lubrication of the tens of thousands of pneumatic cylinder and rod seals of these feeders working at extremely high temperatures above the electrolytic cells. Exceptionally rigorous independent laboratory testing commissioned by Australia's largest smelter, together with unceasing side-by-side operational comparison, has service-proven these TRANZ materials as unbeaten.

All in the range have high electrical insulation values, a major advantage in the highly charged environment of electrolytic cells, a contrast with the undesirable electrical conductance of competitive products based on carbon black graphitic carbon and metal salts like molybdenum disulphide.

Rock-solid reliability serving on integrated feeder pneumatic seals in the most extreme smelting environments in the world - current densities greater than 300,000 Amps, cell temperatures > 900°C - establishes TRANZ A420 & A425 as State of the Art, especially the attainment of 5-7 plus years service life, which represents a 'lifetime' of the cylinder seals, in crust-breakers exposed to the extremity of conditions under which no other compound from the World's best, has been able to serve.

Whether pneumatic cylinder seals are elastomer, thermosetting plastic, ceramic, or combinations of these, TRANZ Performance Lubricants makes proven lubricating compounds ready for service, from Antarctic cold, the ambient and up to peak temperatures as high as 230°C

The data listed here refers to the range of our materials for lubrication of piston and rod seals in high pressure pneumatic equipment.

The single most important aspect of products for service in this business area, is the absolute necessity of the lubricant having proven zero effect on the dimensional stability, tensiles and modulus, of the full range of organic and inorganic elastomers and thermoplastics used in seals construction. Plus zero reactivity with all the associated materials including metals, ceramics and plastics, that are found in modern seal assemblies. Reliable performance under these conditions cannot ever be theorized. It requires lengthy and detailed stability study plus extensive service exposure. In this respect TRANZ offers compounds that have withstood the most critical and far ranging contact stability testing, trials and full-on service for approximately 30 years.

In the following table, reference is made to further aspects of performance in respect of Copper Corrosion Inhibitor presence, or not; the suitability of the grade for incidental metal on metal sliding lubrication, and whether an extreme pressure capability applies. These characteristics are basically inherent to the polymer bases, but enhancement of any of these aspects is possible for specific service tasks. Preparation of special grades for critical service can be undertaken in collaboration with customers and all inquiries are invited.

See table next page

TRANZ A400 Series

Description	High performance greases based on synthetic, polymerics inc. alkylsiloxanes, co-silicone & copolyfluorocarbons, misc. synthetics, with and without metallic & non-metallic EP. Some Food Grade.			
TYPICAL PROPERTIES	**A 410**	**A 414**	**A 420**	**A 425** (see detailed A425 table)
In service since	1986	1988	1990	1992
DEF STAN. Specified	No	No	XG-315 Aircraft	XG-315 Aircraft
Service Temp. Range °C	-45 to +100	-30 to +175	-20 to +200	-20 to +215
Short Term Peak °C	165	195	215	235
Appearance	Pale beige	Pale Green	White	White
Std. Consistencies, NLGI	1-2	2 & 3	2	2
Approx. Hrs. Life @ normal service temp.	20,000	30,000	50,000 - >65,000	60,000 - >65,000
Elec. Resistivity Ohm/cm	18.5	17.5	21.5	25.5
'Speed' Factor	High	Good	Good	Good
Mechanical, Metal on Metal	Fair	Excellent	Good	Good
Elastomer / Plastics contact?	←----------Suitable for all except Silicone Rubbers & LDPE threads---------->			
Suit Elastomer Seals?	Yes	Yes	Yes	Yes
PTFE Seals?	No *1	No *1	No *1	Yes
Suit Ceramic	Yes	Care	Care	Yes
Copper Alloys inhibited? *2	Yes	Yes	No	No
EP Capability *	No	Yes	Yes	Yes
EP Capability *2	No	Yes	Fair	Yes
Notes *1 Refers to the restricted ability of other polymers to 'wet' fluoropolymers *2 Where required, certain of these properties can be supplemented to meet specific requirements.				
Packaging	Cartons containing 20 X 250gm. screw top jars; cartons containing 4 X 5 Kg. tins; and 20Kg. steel open head pails. Enquiries are invited concerning availability or development of alternative packaging forms, both for OEM metering and maintenance.			

APPLICATION

There are THREE Factors which if ignored will frustrate the otherwise excellent service life of any from the above range.

There must be

1. Complete REMOVAL of any trace of previous lubricant
2. A clean, dry air supply - NO particulates and especially ZERO entrained water into which metal ions can dissolve and then act as breakdown catalysts
3. An adequate quantity of grease applied in correct places during assembly

TRANZ cylinder seals lubricants are ALMOST CERTAIN to be NOT compatible with other lubricants - as they certainly are with each other and cannot operate in the presence of other polymers.

Unless they are being applied to new components, clean and free of any transitory or residual films, then seals and their housings will need to be stripped and totally cleaned of any trace of previous lubricant, even of a different TRANZ grade, before lubricating with any of the above TRANZ greases. Where practical, the seals themselves should preferably be replaced, since minute surface absorption of a different previous lubricant into the micropores of the seal, prevents the vital seals surface wetting, which will severely compromise both lubricity and ultimately, the heat life also, of the chosen TRANZ product.

An insufficient quantity of the chosen lubricant used to prepare the seals in the piston head and the rod seal housing, more than any other aspect, has the potential for influencing service life. Sufficient lubricant quantity must be provided to bed the seals and position the surplus to micro-feed the seals during service.

It is necessary to provide a 3-5 mm. thicker ridge of lubricant in the cylinder barrel at each end of and in contact with, the piston head at the limits of its stroke, to feed both the area at the end of the wear stroke and the piston head itself. The same reserve is also necessary for the rod seals. Any less may reduce operational capacity. The limiting factor to this direction will of course be any such excess that could be transported to the air exhaust valves in a quantity that reduces their efficiency or at worst, blocks the muffler. This in turn would cause back pressure and a resulting change in speed in the piston plus a reduction in its effective work rating.

PACKAGING

250 G. jars, 5 Kg. tins, 20 & 60 Kg. steel containers.