XADO INNOVATIVE NANOTECHNOLOGY

Saves resources, improves and restores reliability of your industrial equipment



XADO INDUSTRIAL

Edition 1:2019

REVITALIZATION®

TECHNOLOGY

REVITALIZANT[®] (from Latin vita – life, returning life) is a product added to lubricating materials, operating fluids and fuel. It forms a protective ceramic-metal coating with low friction coefficient on metal parts of mechanisms during their operation. REVITALIZANT® solves the problem of extension of the service life of machines and mechanisms.



The process of ceramic-metal coating formation can be tentatively compared with two simultaneous technologies of surface strengthening. The first one is cementation (surface saturation with carbon and metal carbides). The second is cold-work hardening during which the REVITALIZANT[®] particles act as strengthening bodies. The coating possesses low friction coefficient and high antiwear characteristics. The obtained coating is characterized by positive compressive stresses throughout all its depth and carbon concentration increasing up to the surface.





How does it work?

DEMONSTRATION EXPERIMENT



2. The bearing is filled with XADO Repairing Grease developed for heavily (up to 80%) worn units. The surface with the original nominal characteristics is rough, with deep traces made by a grinding tool.

3. The operating bearing filled with the grease is exposed to the 8,000 N force at the rotation frequency of 1,000 rpm within 15 minutes.

REVITALIZATION[®] itself takes place during operation of the bearing – it means elimination of the defect on the friction surface by creation of a protective ceramic-metal coating. The result of the experiment is shown on the pictures. Traces of the initial factory grinding have completely disappeared.







TIME AND MONEY SAVINGS



Advantages and field of use of REVITALIZANT®

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INDUSTRIAL ENGINES (lubricating and fuel systems)

- Eliminates ovality and taper of the inner surface of cylinders of up to 0.15 mm
- Fully eliminates scratches and microscuffs of up to 0.03 mm in depth on operating surfaces of cylinders
- Levels and increases compression and maximum combustion pressure in cylinders
- Saves by up to 14% of fuel
- Increases engine power by 9–12%
- Decreases CO and HC content in exhaust gases by 2–10 times
- Prolongs the service life by 1.5-2.5 times

COMPRESSORS (reciprocating compressor)

- Eliminates ovality and taper of cylinders up to 0.5 mm
- Eliminates ovality of crankshaft necks up to 0.05 mm
- Eliminates scratches, blowholes and microscuffs of up to 0.04 mm in depth on surfaces of cylinders
- Improves performance by 25%
- Increases pressure and stabilizes oil operating temperature
- Reduces power consumption by 36%
- Prolongs the service life by 2–2.5 times

REDUCERS AND TRANSMISSIONS

- Compensates wear of teeth of gear wheels (up to 0.8 mm)
- Decreases roughness and increases microhardness on tooth contact patterns up to 1,200 HV
- Eliminates pitting blowholes, scratches, microscuffs of up to 0.1 mm in depth on teeth contact patterns
- Decreases loads per unit surface on tooth contact patterns by 2–4 times
- Reduces radial clearances in bearings by 0.07 mm
- Reduces noise by 15% and vibration by 70%
- Prolongs the service life by 2-3 times

Advantages and field of use of REVITALIZANT®

CHEMICAL GROUP

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BEARINGS

- Decreases radial clearances by up to 0.07 mm
- Decreases axial play by up to 0.03 mm
- Increases accuracy class of bearings
- Reduces vibration speed by 1.5-2.5 times
- Reduces noise by 35%
- Decreases vibratory displacement by 25-40%
- Increases running down of bearings by 30-70%
- Prolongs the service life by 2-4 times

HYDRAULIC SYSTEMS

- Increases pressure and performance of hydraulic pumps
- Eliminates leaking through hydraulic control valves
- Increases operating pressure in hydraulic systems by 8–20%
- Improves efficiency of hydraulic machines by 15%
- Decreases temperature to nominal values
- Decreases power consumption by 12%
- Increases performance of hydraulic machines by 1.5–2 times

MACHINES AND PRESSES

- Decreases roughness of workpiece surfaces by up to Ra 0.01
- Decreases radial clearances of spindles by up to 0.04 mm
- Decreases radial runout of spindles by up to 0.03 mm, face runout by up to 0.02 mm
- Decreases ovality and taper of compressor cylinders by up to 0.15 mm
- Reduces clearances and eliminates wear of guides
- Stabilizes operation of hydraulic systems
- Prolongs the service life by 1.5-2 times







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REVITALIZANT®

XADO Gel-REVITALIZANT®





XADO Gel-REVITALIZANT[®] is an innovative unique product, which allows repairing and restoring friction surfaces without unit disassembly. It converts excessive friction energy and involves it into formation of a durable ceramic-metal coating. This coating helps to eliminate defects, restores geometry of surfaces and provides high antifriction and antiwear properties.

Gel-REVITALIZANT[®] is applied in mechanisms with metal-to-metal friction pairs operating with lubricant, grease, hydraulic fluid or fuel. It can be any industrial unit or assembly: compressors of different types, industrial reduction gears and transmissions, hydraulic systems (oil pumps of any type), rolling and sliding bearings, open gear drives, metal-cutting machine tools and equipment, forging hammers, presses and die blocks, smoke exhausters and blower fans, open gear and open chain drives, forming and milling roll units, template-controlled systems, electric motor and generator units, industrial internal combustion engines, fuel equipment etc.

As a result of REVITALIZATION[®], a new coating is formed on surfaces of friction pairs – parts restore their geometry. A new ceramic-metal coating possesses unique properties.

| No. | Properties | Before treatment | After treatment |
|-----|-------------------------|------------------|-----------------|
| 1 | Microhardness, HV | 800 | 1,200 |
| 2 | Corrosion resistance | low | high |
| 3 | Roughness, Ra, µm | 0.5 | 0.04 |
| 4 | Coefficient of friction | 0.04 | 0.003-0.007 |
| 5 | Antiwear properties | normal | high |

That is why after REVITALIZATION[®] parts guaranteedly serve 2–4 times longer. The revitalized mechanism will operate at its best!

Application instructions:

Treatment procedure is developed individually for particular industrial equipment based on its construction and wear rate of parts.

For additional information please contact us: support@xado.com, export@xado.com





XADO Gel-REVITALIZANT®

| No. | Product name | Application | Packaging | Article |
|-----|-----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------|
| 1 | Gel-REVITALIZANT [®] for diesel engines | For industrial diesel engines (tractor, truck, locomotive, marine/building/ construction/mining equipment engines etc.) | aerosol can 10 ml tube 100 ml tube 125 ml can 1 L | XA 10502 XA 10402 XA 18402 XA 11702 |
| 2 | Gel-REVITALIZANT [®] for gasoline engines | For industrial gasoline engines (tractor, truck, locomotive, marine/building/ construction/mining equipment engines etc.) | tube 9 ml aerosol can 10 ml tube 125 ml can 1 L | XA 10001 XA 10501 XA 10401 XA 11701 |
| 3 | Gel-REVITALIZANT [®] for high pressure fuel pumps (fuel equipment) | For fuel equipment of diesel engines, high pressure fuel pumps (inline/distributor injection pumps, pump-injector units etc.) | tube 9 ml aerosol can 10 ml tube 100 ml can 1 L | XA 10008 XA 10508 XA 10408 XA 10708 |
| 4 | Gel-REVITALIZANT [®] for gear boxes, transfer cases and differentials | For all types of industrial gearboxes (parallel shaft-type/bevel/planetary/ worm gearboxes) For transmission units of automotive transport and equipment (gearboxes, transfer cases, differentials) | tube 100 ml can 1 L | XA 19203 XA 19703 |
| 5 | Gel-REVITALIZANT® for power steering pumps (hydraulic systems) | For hydraulic pumps, hydraulic motors and hydraulic distribution valves | tube 100 ml can 1 L | XA 10204 XA 18704 |
| 6 | Gel-REVITALIZANT [®] for compressors and bearings | For units and parts of compressors of all types as well as for all types of bearings operating in the oil bath | tube 9 ml tube 100 ml can 1 L | XA 10906 XA 10206 XA 10706 |

XADO APPLICATION IN INDUSTRY:

- Automobile transport
- Construction
- Metallurgy
- Mining Road-building
- Agriculture
- Food manufacturing and processing
- Medical industry Paper, print and packaging
- Railway
- River and sea transport
- Lifting and handling
- Oil and gas production and processing
- Military/Defense
- Energy
- etc.





07

APPLICATION INSTRUCTIONS



XADO Gel-REVITALIZANT®



Diesel or gasoline engines with the oil system capacity of up to 30 L are treated with XADO Gel-REVITALIZANT[®] for diesel engines or XADO Gel-REVITALIZANT[®] for gasoline engines in three stages (for every engine type correspondingly).

| Engine oil system capacity, L | Number of 9 ml tubes of XADO Gel-REVITALIZANT [®] for diesel/gasoline engines, pcs. | Treatment scheme by stages |
|----------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------|
| 3-10 | 3 | 1+1+1 |
| 11–20 | 6 | 2+2+2 |
| 21–30 | 9 | 3+3+3 |

Accumulated operating time between the stages comprises 8–12 hours or 150–250 km of run.

The full treatment cycle makes at least 400 hours of accumulated operating time or at least 1,500 km of run beginning from the first treatment stage.

Diesel engines with the oil system capacity of more than 30 L are treated with XADO Gel-REVITALIZANT[®] for diesel engines in 3–8 stages in the amount of 0.6–1.8 ml of the gel for 1 L of operational oil for one treatment stage.

Before introducing the product, the engine should be warmed up to the operating temperature.

Number of the treatment stages depends on the wear rate and construction of the engine (see the table on page 11).

Treatment of fuel systems is conducted using XADO Gel-REVITALIZANT[®] for high pressure fuel pumps (fuel equipment) in one stage by introduction of the necessary amount of the gel into fuel according to the table below:

| Diesel engine capacity, (L) | of XADO Gel-REVITALIZANT [®] for high pressure fuel pumps (fuel equipment), pcs. | |
|-----------------------------|----------------------------------------------------------------------------------------------|--|
| < 5 | 2 | |
| 5–15 | 4 | |
| 15–30 | 7 | |
| 30-75 | 10 | |
| 75–100 | 14 | |
| 100–140 | 18 | |
| 140–175 | 22 | |
| | | |

The full treatment cycle makes at least 80 operating hours or 4,000 km of run.



APPLICATION INSTRUCTIONS

XADO Gel-REVITALIZANT®



Reciprocating compressors are treated with XADO Gel-REVITALIZANT[®] for compressors and bearings in 3–5 stages in the amount of 0.8–2 ml of the gel for 1 L of operational oil for one treatment stage (see the table on page 11 for clarification).

Screw and centrifugal compressors with the lubrication system including an oil pump are treated with XADO Gel-REVITALIZANT[®] for power steering pumps (hydraulic systems) in 5 stages in the amount of 0.8 ml of the gel for 1L of operational oil for one treatment stage (see the table on page 11 for clarification).

Screw and centrifugal compressors with the lubrication system without the oil pump are treated with XADO Gel-REVITALIZANT[®] for power steering pumps (hydraulic systems) in 8 stages in the amount of 0.5 ml of the gel for 1L of operational oil for one treatment stage (see the table on page 11 for clarification).

Accumulated operating time between the stages comprises 12–24 hours.

The full treatment cycle makes at least 400–500 hours of accumulated operating time of the compressor beginning from the first treatment stage.

Attention!

Centrifugal, scroll and screw compressors as well as turbocompressors are treated individually, according to the procedures developed by XADO technicians.



Reducers and gearboxes are treated with XADO Gel-REVITALIZANT[®] for gear boxes, transfer cases and differentials in 1–3 stages without the oil change in the amount of 3–6 ml of the gel for 1 L of operational oil for one treatment stage (see the table on page 11 for clarification).

Reducers operating with hydraulic system elements in the same oil bath are treated with XADO Gel-REVITALIZANT[®] for power steering pumps (hydraulic systems) in 6–10 stages in the amount of 1.5–2.5 ml of the gel for 1 L of operational oil for one treatment stage (see the table on page 11 for clarification).

Accumulated operational time between the stages comprises 12–24 hours.

The full treatment cycle makes at least 450 hours of accumulated operational time beginning from the first treatment stage.

Hydraulic systems of industrial equipment are treated with XADO Gel-REVITALIZANT[®] for power steering pumps (hydraulic systems), which is added into hydraulic fluid in 6–10 stages in the amount of 0.5–1 ml for 1 L of operating fluid for one treatment stage.

Accumulated operating time between the stages makes 12–18 hours.

The full cycle of the hydraulic system treatment makes 550 hours of accumulated operating time beginning from the first treatment stage.



APPLICATION INSTRUCTIONS

XADO Gel-REVITALIZANT®





Rolling bearings in the oil bath are treated with XADO Gel-REVITALIZANT[®] for compressors and bearings in 3 stages without the oil change in the amount of 1.2 ml of the gel for 1 L of operational oil for one treatment stage. Sliding bearings are treated with XADO Gel-REVITALIZANT[®] for compressors and bearings in 6 stages in the amount of 1.5 ml of the gel for 1 L of operational oil for one treatment stage.

The interval of accumulated operating time between the stages makes 20–30 hours. The full cycle of bearings treatment makes 550 hours of accumulated operational time beginning from the first treatment stage.

For restoration of worn rolling bearings and slide assemblies lubricated with consistent lubricant, XADO Repairing Grease and XADO Restoring Grease are applied.



Spindle assemblies, gearboxes having the combined lubrication system, mechanisms of the grinding wheel head and control wheel head, a mechanism of the cartridge head and a spindle of internal grinding machines operating in the oil bath are treated with XADO Gel-REVITALIZANT[®] for compressors and bearings in 3 stages in the amount of 3 ml of the gel for 1 L of operational oil for one treatment stage.

Gearboxes and feed boxes, bearing brackets of milling machines with the separate lubrication system are treated with XADO Gel-REVITALIZANT[®] for gear boxes, transfer cases and differentials in 3 stages in the amount of 3 ml of the gel for 1 L of operational oil for one treatment stage.

Spindle bearings of grinding wheel heads of external grinding machines operating in the oil bath are treated with XADO Gel-REVITALIZANT[®] for compressors and bearings in 6 stages in the amount of 1.5 ml of the gel for 1 L of operational oil for one treatment stage. Spindle assemblies of coordinate boring machines are treated with XADO Gel-REVITALIZANT[®] for power steering pumps (hydraulic systems) in 5 stages in the amount of

0.8 ml of the gel for 1 L of operational oil for one treatment stage. Accumulated operating time between the stages comprises 8–12 hours.

The full treatment cycle of assemblies makes at least 450 hours of accumulated operating time of the machine beginning from the first treatment stage.

Treatment of screw spindles lubricated with oil is conducted by introducing XADO Gel-REVITALIZANT[®] for gear boxes, transfer cases and differentials into lubrication oil of the screw pair in the amount of 9 ml of the gel for 1 L of operational oil. The full treatment cycle makes at least 550 hours of accumulated operating time.

Sliding guides are treated with XADO Gel-REVITALIZANT[®] for compressors and bearings by introducing the gel in the amount of 9 ml for 1 L of operational oil for the whole operating time. The full cycle of sliding guides treatment makes at least 700 hours of machine accumulated operating time.

Hydraulic systems of machines. See hydraulic systems.



Headquarters: 4, 23 Serpnia Lane, Kharkiv 61103, Ukraine. Tel.: +38 (057) 717-55-55, 717-44-44, fax: +38 (057) 714-11-11. www.xado.com, info@xado.com

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