

ADDINOL Turbine Oil CA for the use in chlorine gas compressors



ADDINOL Turbine Oil CA (chlorine absorbing) is a high-performance lubricant specially tailored to the demanding operating conditions in the compression of chlorinated process gases. It is based on carefully selected HC base oils in combination with an optimally matched, zinc-free additive.

- ✓ Specifically developed for use in chlorine gas compressors, in cooperation with Siemens Turbomachinery Equipment GmbH
- ✓ Unique technology for the control of chlorinated compounds
- ✓ Ideal for highest thermal loads and extreme conditions

Benefit from this in practice:

- ✓ Reliable chemical bonding of chlorinated compounds, e.g. hydrogen chloride
- ✓ Highest production reliability through optimal protection of the system components against corrosion
- ✓ Excellent aging stability due to high-quality basic components
- ✓ Effective prevention of foam formation for trouble-free operation (without power losses)
- ✓ Highest thermal stability for safe lubrication and reliable cooling under high-temperature loads
- ✓ Maximum system efficiency and uniform power transmission due to excellent air and water separation capability
- ✓ Extended oil change intervals compared to conventional turbine oils
- ✓ Planning of maintenance-related downtimes, reduction of maintenance costs
- ✓ Targeted oil analyses for reliable condition monitoring of oil and plant

Characteristic values	Test conditions	Unit	Turbine Oil CA	Tested acc. to
ISO VG			32 – 46	DIN 51519
Viscosity	40 °C	mm ² /s	38	ASTM D 7042
	100 °C	mm ² /s	6.8	
Flash point	COC	°C	> 246	DIN EN ISO 2592
Corrosion protection on steel	Method A and B		passed	DIN ISO 7120
Corrosion protection on copper	at 125 °C, 3h	corrosion level	1	DIN ISO 2160
Ageing behaviour (Life TOST)	Time until NN is increased by 2.0 mg KOH/g	h	> 10,000	DIN EN ISO 4263/1

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When working with compressors, despite the use of complex protective mechanisms (e.g. labyrinth seals or the use of nitrogen), the entry of the medium to be compressed into the lubricant is unavoidable. Chlorine is an aggressive, highly reactive chemical element that causes severe corrosion. Corrosion impairs the function of the components and thus the operation of facilities. Furthermore, the addition of chlorine extremely accelerates oil aging. This results in high time and cost-intensive expenditure for unscheduled downtimes and maintenance and repair work.

In addition to the specific stress caused by chlorinated compounds, the usual requirements for turbo compressors, such as high loads, speeds and temperatures, are also commonplace. Turbo compressors, therefore, require reliable lubrication for stable operation. The lubricants must fulfill a whole range of different functions with specific requirements. They are used for bearing lubrication on compressors, but also on gearboxes and engines.



Requirements	DIN 51515/2	Siemens Turbomachinery Equipment GmbH	ADDINOL Turbine Oil CA
Viscosity index	90	≥ 90	139
Purity level	20/17/14	≤ 20/17/14	17/15/12
Air separation ability at 50°C (min)	< 5	≤ 4	< 3
Foaming characteristics			
at 24 °C	max. 450/0	≤ 450/0	0/0
at 93.5 °C	max. 50/0		0/0
at 24 °C after 93.5 °C	max. 450/0		0/0
Water content (mg/kg)	≤ 150	≤ 200	< 50
Water separation ability (s)	max. 300	≤ 300	< 100
Ageing behaviour RPVOT (min)	> 750	≥ 750	> 1,400
Load stage FZG (A/8.3/90)	8	≥ 8	≥ 9
Binding of chlorine (ppm)		50 ppm	> 1,000 ppm*
Max. operation temperature (°C)		+105 °C	+150 °C

Table 1: DIN and OEM requirements and results of ADDINOL Turbine Oil CA (fresh oil values)

* with regular condition monitoring by oil analyses

Maximum ageing stability and targeted prevention of deposits

Increased temperatures and the introduction of foreign substances into the lubricating oil accelerate oil aging and can lead to the degradation of the additives and to cracking of the base oil components. Insoluble degradation products precipitate as sludge or deposit as lacquer-like residues on the surfaces.

The carefully selected base oils of the ADDINOL Turbine Oil CA and its optimally matched additives exhibit the highest oxidative stability even under extreme thermal loads.

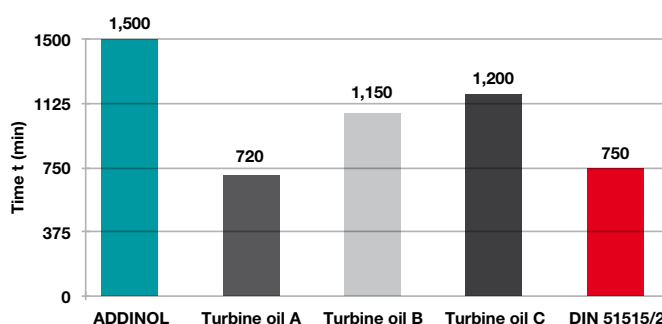


Chart 1: In the RPVOT* ADDINOL Turbine Oil CA exceeds the value demanded according to DIN 51515/2 and reaches superior time spans compared to competitor products.

* RPVOT = Rotating Pressure Vessel Oxidation Stability Test

Performance Profile

Reliable binding of chlorine

Aggressive, highly reactive chlorine compounds cause extremely corrosive reactions on the surfaces of the components and also accelerate oil aging. ADDINOL Turbine Oil CA is equipped with a special chlorine trap, which absorbs the aggressive chlorine elements to saturation, chemically binds them, and makes them harmless. Thanks to the reliable prevention of corrosive reactions on the metal components, the risk of system failures and costly repairs is significantly reduced. The use of ADDINOL Turbine Oil CA guarantees reliable plant availability and high reliability in production. The binding of chlorine also significantly extends the service life of the oil, as chlorine in bound form can no longer have an accelerating effect on oil aging. Longer replacement intervals, as well as plannable downtimes and maintenance measures, are achieved this way.



Picture 1: White metal rods, washed by turbine oil at 60°C for 24h: ADDINOL Turbine Oil CA (right) shows no signs of corrosion compared to conventional turbine oils (left and center)

Corrosion tests are carried out with steel bars in accordance with DIN ISO 7120. White metal, however, is used in systems for chlorine gas compression. Our in-house tests have been adapted accordingly. White metal rods were washed with various turbine oils at 60 °C for a period of 24 hours. The results speak for themselves: the corrosive effect of aggressive agents is only prevented when using ADDINOL Turbine Oil CA (see Figure 1).

The capacity of the ADDINOL Turbine Oil CA to absorb chlorine was proven with the support of Wolfen Analytik GmbH*. In an elaborate laboratory procedure, a defined amount of chlorine was injected into the oil and the chlorine content was subsequently determined by burning the oil sample in the oxygen-argon flow. ADDINOL Turbine Oil CA can absorb and chemically bind much more than the required 50 ppm. The corresponding certificate of Wolfen Analytik GmbH can be viewed on request at ADDINOL.

* certified analysis laboratory for tests with chlorine gas, co-operation on the recommendation of AkzoNobel

Excellent air release property, above-average foam behavior

When a plant is in operation, air is inevitably introduced, which interferes with the even transmission of power and the efficient operation of the plants. In addition, the introduction of air carries the risk of cavitation on the components and promotes oil aging. Due to increased circulation speeds, the turbine oil has less time to calm down. For these reasons, entrained air bubbles must be separated quickly and reliably from the lubricant. ADDINOL Turbine Oil CA has excellent air release properties (LAV): In the LAV test at 50 °C (DIN ISO 9120), ADDINOL Turbine Oil CA achieves complete air separation within 3 minutes and is thus clearly above the norm (see chart 2).

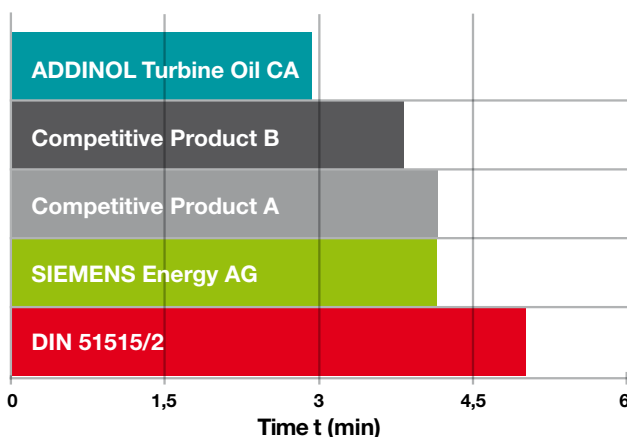
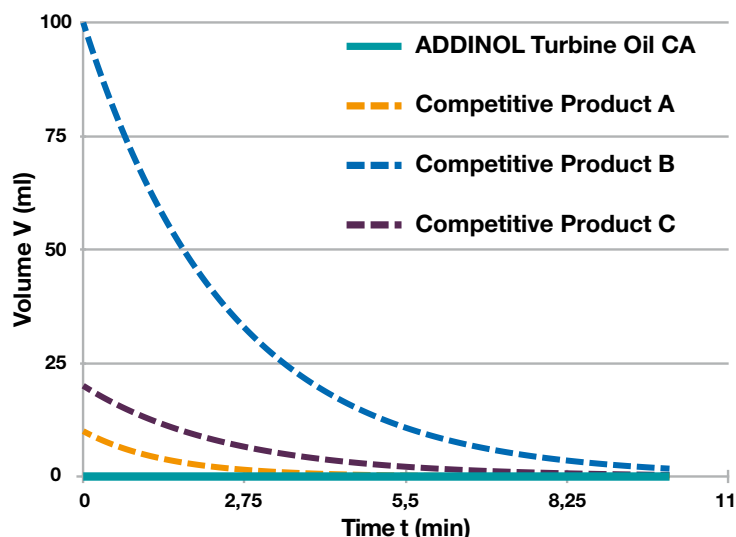


Chart 2: Air separation capacity (acc. to DIN ISO 9120) of ADDINOL Turbine Oil CA compared with conventional turbine oils

Performance Profile



Air release produces foam on the surface which can impair the formation of a hydro-dynamic lubricating film and cause leaks if it passes through seals and air vents. This foam is effectively minimized when ADDINOL Turbine Oil CA is used, thanks to specially adapted silicone-free defoamers and carefully selected base oils (see chart 3). This ensures stable operation and prevents performance losses in the system.

Chart 3: Foaming characteristics of ADDINOL Turbine Oil CA compared with competitor products

The ADDINOL Analysis Service

The **proven** analysis service pays off for the planning of maintenance-related downtimes and for maximum plant safety. With our ADDILAB tool you can easily monitor the condition of oil and plant and receive reliable information about:

- ✓ the further usability of the oil
- ✓ wear elements that provide information about possibly affected components
- ✓ contamination that has entered the oil and can interfere with the operation of the system

In addition to competent support by our team, precise condition monitoring offers planning reliability, especially against the background of time and cost-intensive system failures; with the help of the tool, longer replacement intervals can be implemented with maximum operational safety.

Your advantages when using ADDINOL Turbine Oil CA at a glance:

- ✓ effective control of the risk of corrosion through the introduction of chlorine compounds
- ✓ no sudden system failures
- ✓ high production reliability
- ✓ plannability of maintenance-related downtimes
- ✓ reliable operation of facilities

