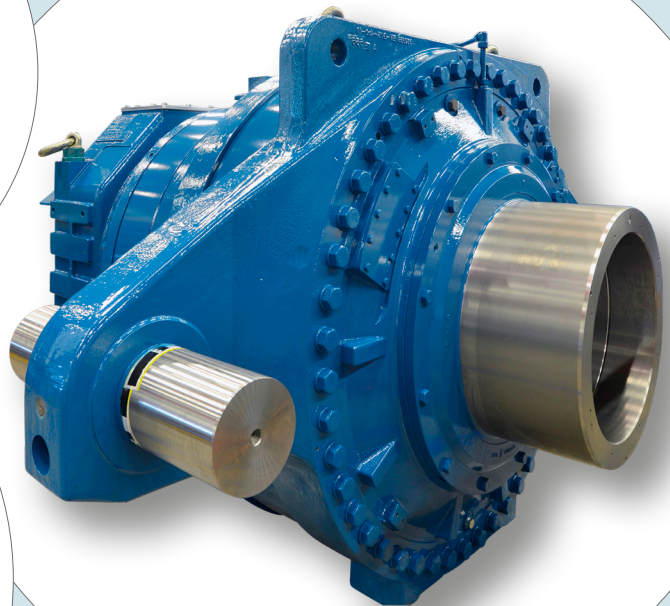


CJC[®] Pressure Kit

Lower your ISO codes and extend the lifetime of your gearbox by upgrading your already installed CJC[®] Oil Filter with a CJC[®] Pressure Kit



Lower your ISO Code



Improve your WTG availability

Upgrade your CJC® Oil Filter and lower your ISO codes to extend the life of your gearbox

One of the constant issues in gear lubricants is entrained air. Tiny air bubbles trapped in the oil. All gear lubricants contain additives in order to release these air bubbles since they cause problems. But the smaller they are, the longer it takes. This issue is also present in oil filters. Our recent research has showed us that by increasing the pressure in the filter housing, we increase the efficiency. This effect is traced back to above issue with the entrained air. Any obstruction in a flow constitutes a pressure drop. If an air bubble is subjected to a pressure drop, it will grow in volume. If this takes place inside a filter media, it has a negative effect on the efficiency.

By pressurising the complete oil filter, we minimise the pressure drop and thus increase the efficiency. Actual on site testing reveals an improvement of 1-3 ISO Code Classes on all particle sizes.

At the same time, we introduce a permanent air bleed on the filter housing. This feature eliminates any accumulation of air in the oil filter, as the air is led to the outlet of the oil filter as large air bubbles, which the additives can easily manage and is then released in the reservoir/GBX.

The conversion is simple and manageable, takes 20 to 30 minutes in the nacelle, and can be carried out during routine inspections and filter insert change.

Life extension table - cleanliness level, ISO codes for gearboxes

Source: www.noria.com

	21/19/16	20/18/15	19/17/14	18/16/13	17/15/12	16/14/11	15/13/10	14/12/9	13/11/8	12/10/7
24/22/19	1.3	1.7	2	2.5	3	3.5	4	5	5.5	8.5
23/21/18	1.3	1.4	1.6	2	2.5	3	3.5	4	5.5	8
22/20/17	1.05	1.3	1.4	1.7	2	2.5	3	4	5.5	7
21/19/16		1.1	1.3	1.5	1.7	2	2.5	3.5	4.5	6
20/18/15			1.1	1.3	1.5	1.7	2	2.5	3.7	5
19/17/14				1.1	1.3	1.5	1.7	2	2.5	3.5
18/16/13					1.1	1.3	1.5	1.8	3	3.5
17/15/12						1.1	1.4	1.5	1.8	2.2
16/14/11							1.2	1.4	1.5	1.8
15/13/10								1.1	1.3	1.6

LET - Table

Evaluation of particle count compared to machine lifetime.

The table describes the expected increase in lifetime when oil cleanliness is improved.

Example:

If the current gear oil cleanliness level is found to be ISO 17/15/12 and the gear oil is cleaned to a level of 15/13/10 the

lifetime of critical components in the gearbox is prolonged by a factor of

1.4

FACT the amount of 4 micron particles are reduced by **99.5%**

Laboratory results from C.C.JENSEN A/S

Our C.C.JENSEN Laboratory has conducted tests to show the effect of applying static pressure to oil filters in a worst-case scenario regarding both air and dirt. Two particle counters were monitoring 4 micron-size particles upstream and downstream of the CJC® Filter Insert.

When applying a static pressure of 2 bars (30 psi) it is possible to reduce the ISO Code Class by up to 8 classes in severe conditions. In terms of efficiency, this means a reduction on 4 micron particles by 99.5% in a single pass.

In numbers this means a contamination level from 500,000 particles to 2,000 4 µm particles per 100 ml oil.



Test of oil samples at C.C.JENSEN A/S laboratory

Satisfied customers – worldwide

➤ Svensk
Vindkraftförening



Wind Turbine, Vestas V52-850 kW, Gearbox Upgrade CJC® Application Study

Gear Oil

Application Study
written by:

Jonas Rutgeron
C.C.JENSEN AB
Sweden

&

Martin Jansson
Stema Wind
Sweden

2014



CUSTOMER
Customer: SVEF, Svensk Vindkraftförening
Wind Farm: BÖRSTAD III, Östergötland

SYSTEM
Turbine: Vestas V52-850 kW
System: Gearbox
Oil Type: Texaco Meropa 320
Oil Volume: 155 liters

TEST
The test was carried out to document the efficiency of the CJC® Pressure Kit and the CJC® Continuous Air Bleed system on an existing CJC® Oil Filter. These upgrades ensure optimum dirt holding capacity and increased filtration efficiency.

INSTALLATION
The CJC® Pressure Kit and CJC® Continuous Air Bleed system is retrofitted up tower in a process that takes approx. 30 min.

RESULTS
The level of 2 µm particles is reduced by a factor of 62%, increasing the bearings' cleanliness towards particle wear by 20%.

CONCLUSIONS
1st Conclusion:
The original filtration system on the Vestas V52, - the CJC® Fine Filter HDU 15/25 PV - is still after 7 years of operation capable of maintaining the oil contamination level well below the guidelines of ISO 81400-4 (Design & Spec. of Gearboxes).

2nd Conclusion:
With the CJC® Pressure Kit you can optimize your existing CJC® Fine Filters and clean the gear oil in your wind turbine
down to a level of 1/3 of the previous level
Cleaner oil gives better protection of the gearbox and of your wind turbine gearbox investment.

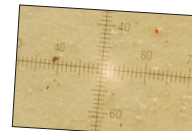
Oil in wind turbine components	Recommended ISO 4406 Oil Cleanliness *)
Gearbox	17/15/12
Pitch hydraulic	16/14/11
Main bearing	16/14/11

*) Source: Noria Corporation

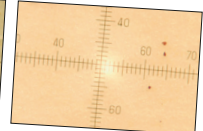


Vestas Wind Turbine V52-850 kW with CJC® Pressure Kit installed

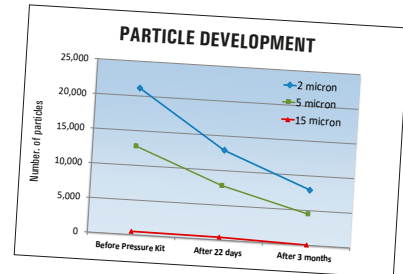
OIL SAMPLES



Oil sample membranes BEFORE CJC® Pressure Kit



Oil sample membranes AFTER CJC® Pressure Kit



RESULT

pr. 100 ml	BEFORE CJC® Pressure Kit	AFTER 22 DAYS	AFTER 3 MONTHS
> 2 micron	21,173	12,971	8,001
> 5 micron	12,789	7,843	4,497
> 15 micron	477	395	51
ISO Code	15/14/9	14/13/9	14/13/6

ASWI9006-UK
Wind Turbines
06.02.2017
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➤ Vattenfall Wind Power AB
Mr. Thomas Stalin, Senior Wind Technology Expert
Statement from LinkedIn group: Wind Turbine Gearbox Engineers, from 2015:

“10 fold reduction of particles, by pressurising our CJC® Oil Filter”

“By rebuilding my CJC® Oil Filter HDU 15/25 with a non-returnvalve increasing the pressure over the CJC® Filter Insert and by draining the air in the mainline filter of 9 x Vestas V90 2 MW turbines, I decreased the particles by a factor of 10 in about 3 months operation. The cost was about 500 Euro in equipment. Now I have better cleanliness than 16/14/11 according to ISO 4406:06”
says Mr. Thomas Stalin from Vattenfall.

Cleaner gear oils and increased uptime

CJC® Pressure Kit

Performance improvement for already installed CJC® Oil Filters



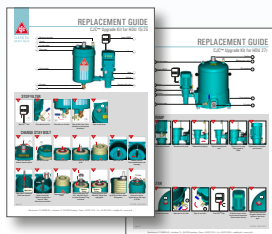
By upgrading your already installed CJC® Fine Filter with the CJC® Pressure Kit, you obtain an increased particle retention rate. Hereby you ensure an even higher performance of your CJC® Fine Filter.

Your benefits:

- Removal of entrained air
- Lower your ISO code
- Improved WTG performance
- Reduced oil change interval
- Even cleaner gear oil

How to install a CJC® Pressure Kit

The CJC® Pressure Kit is easily installed during a normal service interval by following instructions in the Replacement Guides.



Guides on how to replace filter inserts and install the CJC® Pressure Kit for 15/25 and 27/27-series

To download Replacement Guides

Please visit our website:

www.cjc.dk/pressure-kit

Where to install the CJC® Pressure Kit

Wind Turbines with CJC® Oil Filters that can be upgraded easily

Contact your local CJC® representative to select the right CJC® Pressure Kit for your CJC® Fine Filter - the options below are meant as guides.

Company	Size
Acciona	850 kW-1,5 MW, 3 MW
Alstom-Ecotécnia	ECO 80, ECO 74, ECO 62, ECO 48
Bard Engineering	5 MW
Clipper Wind	2.5 MW (Liberty)
CNR	1.5 MW, 3.0 MW
CSIC	2.0 MW, 5.0 MW
DEC (Dong Fang)	1.5 MW (retrofit), 2.0 MW, 3.0 MW
DeWind	D4, D6, D8, D9.0, D9.1, D9.2
Gamesa Eólica	G47, G52, G80, G81, G90, G97, G106, G114, G126, G128, G132
GE Wind	GE 1.5 MW, GE 2.5 MW
Goldwin	3.0 MW
Guodian United Power	1.5 MW, 3.0 MW
Hewind	1.5 MW, 2.5 MW
INOX Wind	2.0 MW
Lagerwey Wind	2.0 MW
Mitsubishi Wind	2.4 MW
Navantia / Sofesa	600 kW, 1.3 MW, 2.3 MW
NEG Micon	NTK 500, NTK 600, NM 600, NM 750, NM 900
Nordex Energy	600 kW, 800 kW, 1.3 MW, 2.5 MW
RRB Energy	600 kW, 1.8 MW
Senvion/Repower (retrofit)	1.5 MW, 3.0 MW, 5.0 MW, 6.25 MW
Sewind (Shanghai Electric)	2.0 MW, 2.3 MW, 3.6 MW
Shenyang Blower Works	2.0 MW
Siemens Wind Power	600 kW, 1.0 MW, 1.3 MW, 2.0 MW, 2.3 MW, 3.6 MW, 4.0 MW
Suzlon Wind Energy	1.5 MW (S82), 2.1 MW (S88)
Vestas Wind Systems	V39, V42, V44, V47, V52, V66, V80, V90, V100, V110
Windey	750 kW (retrofit)
WinWind	1.0 MW
Xuji Wind Power	2.0 MW

Important

Not to be used on CJC® Fine Filter HDU 15/25 produced **before** January 2001

C.C.JENSEN A/S
www.cjc.dk

