

Service Letter

No.:

SL88-229/OES January 1988

Dear Sirs,

MAN B&W Turbochargers NR20, NR26, NR15/R, NR20/R, NR24/R, NR26R

Transverse play of rotor

Since experience shows that the instruction for checking rotor for transverse play (bearing clearance) can be misinterpreted, the following enclosed amendments to the OPERATING MANUAL FOR EXHAUST GAS TURBOCHARGERS have been prepared.

- Technical Data, Gaps and Clearances (9.87 and 12.87 for NR24/R)
- Checking Rotor for Transverse Play (Bearing Clearances) Work Card No. 500.06 (9.87)

The recommended transverse play - in the amended instruction - is enlarged, i.e. longer periods between replacement of the resp. parts can be expected.

Best regards,

MAN B&W DIESEL A/S, HOLEBY

Bent Hansen

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Cables oildiesel maribo
Marketing Telex 40646 hodiel dk
Service

 Service

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 40280 hodiel dk

 Reg no
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TECHNI CAL DATA

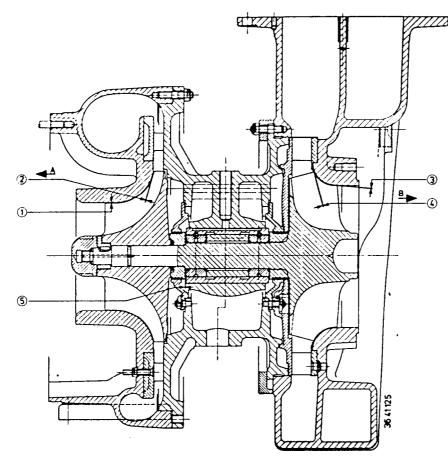
Gaps and Clearances

NR 20

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Measure radial gaps () and (3) using feeler (thickness) gauge, and axial gaps (2) and (4) by means of soft metal imprint (lead wire). Always measure at 3 points on the circumference and calculate mean value.

Apply dial gauge to suitable axial surface and measure axial play@ of rotorby vigorously moving the rotor in the directions A and B. Remov obstructive materials from the labyrinth seal boreholes beforehand, if any. However, do not remove wear tracks.

Posn.	Designation of Parts	Part No.	Ga		new Clear	ance	-	ice or
Fig.			min	max	min	ma:	min	ma*
1	Compressor wheel - Com- pressor casing, radial	520. 005 546. 001	0. 6	5 0.	75	••	0. 55	0. 85
2	Compressor wheel - Com- pressor casing, axial *	520. 005 546. 001	0. 50	1. 15			0. 40	1. 25
3	Rotor - Gas admission casing, radial	520. 001 501. 001	0. 50	0. 57		- -	0. 40	0. 70
4	Rotor - Gas admission casing, axial **	520. 001 501. 001	0. 50	0. 90			0. 40	1. 00
5	Bearing bush -	Labyri nth	1		0. 20	0. 27	-	0. 33

Admissible aberration from the plane of rotation of the compressor wheel (impeller)

(measured with dial gauge at largest radial distance) 0.06 mm

Admissible transverse movement of rotor in bearings: See Work Card 500.06.

*measured with rotor pushed up in the direction A ** measured with rotor pushed up in the direction B

* with the rotor pushed up in opposite direction, withdraw measured axial p^{lay} 5.

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CHECKING ROTOR FOR TRANSVERSE PLAY (Bearing Clearance)

NR 20

500

Arbeitskarte-Nr. Work card No. Carte travait No. Tanjeta trabaja No.

500.06

520.cc5 517.co2 520.cc1 36 35 634

TOOLS REWIRED

1 Dial gauge 1 Dial gauge holder

LEGEND

517.002 Bearing bush 520.001 Turbine rotor 520.005 Compressor wheel.

GENERAL

Judgement on condition of bearing by measuring transverse play is only possible in case of labyrinth seals already run in (after approx. 500 operating hours).

STARTING POSITION

Silencer or air intake casing and compressor casing removed, or cartridge removed.

SEOUENCE OF OPERATION

- 1. Attach dial gauge with holder in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial. position.
- 2. Tilt the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
- 3. Recommended measures, especially when close to the upper limit:

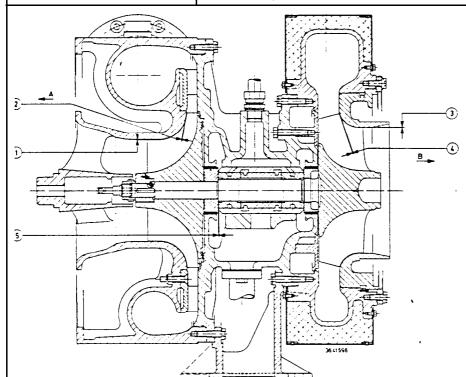
Measuring range [mm]	Remarks
to 1.00	Range of admissible transverse play (corresponds to the tolerances of the radial bearing clearance for new turbochargers)
1.00 to 1.30	Inspection of single parts of the cartridge by specialized service personnel during the next opportunity, Checking: Quality and pressure of the lube oil.
above 1.30	Operating reliability endangered. Replace the respective parts through specialized service personnel or exchange cartridge. Checking: Quality and pressure of the Lube oil.

<u>Note</u>: Is there no possibilty to balance the rotor at site, we strongly recommend to let this do of first opportunity by the manufacturer or in a service station.

Otherwise, shortened Life time of the bearings has to be expected.

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Gaps and Clearances



Measure radial gaps ① and ② using feeler (thickness) gauge, and axial gaps ② and ④ by means of soft metal imprint (lead wire). Always measure at 3 points on the circum-

ference and calculate mean

value.

Apply dial gauge to suitable axial surface and measure axial play 5 of rotor by vigorously moving the rotor in the directions A and B. Remov obstructive materials from the labyrinth seal boreholes beforehand, if any. However, not remove wear tracks.

, .				When New			Replace or	
os. in	Description of Farts	Part No.	Gaps		Clea	rances	remachin	1e
drwg.	·		min.	max.	יטוש.	max.	min.	max.
1	Compress or wheel - compressor	520.005	0.60 0.7	10		_	0.50	0.90
1	casing, radial	546.001	0.00 0.7	U	_		0.50	0.90
2	Compressor wheel -compressor	520.005	0.40.00	0			0 0 5	1 1 0
Z	ćasing, axial +	546.001	0.40 0.9	0		-	0.35	1.10
3	Turbine rotor -gas admission	520.001	0.60	0	.70 -	-	0.50	0.90
3	casing, radial	501.001	0.60	0,	, / U = 	_	0.50	0.90
4	Turbine rotor - gas admission	520.001	0.35 1.0	4			0.30	1.25
4	casing, axial ++	501 .001	0.55 7.0	4			0.50	1.2 3
5	Bearing bush - labyrinth ring,							
	axia I				0.26	0.35	-	0.42

0.06 mm

Transverse play of the rotor in the bearings: See Work Card 500.06.

 $oldsymbol{+}$ measured with the rotor pushed up in the direction A

}*

++ measured with the rotor pushed up in the direction B

* with the rotor pushed up in opposite direction,

withdraw measured axial play

(5)

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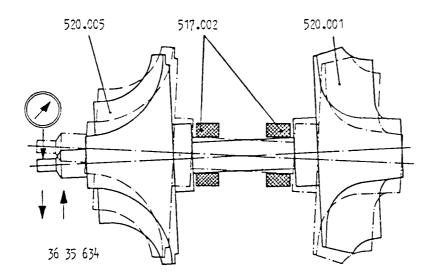
CHECKING ROTOR FOR TRANSVERSE PLAY (Bearing Clearance)

NR 26

500

Arbeitskante-Nr. Work cand No. Cante travail No. Tanjeta trabaja No.

500.06



TOOLS REWIRED

1 Dial gauge1 Dial gauge holder

LEGEND

517.002 Bearing bush 520.001 Turbine rotor 520.005 Compressor wheel

GENERAL

Judgement on condition of begring by measuring transverse play is only possible in case of labyrinth seals already run in (after approx. 500 operating hours),

STARTING POSITION

Silencer or air intake casing and compressor casing removed, or cartridge removed.

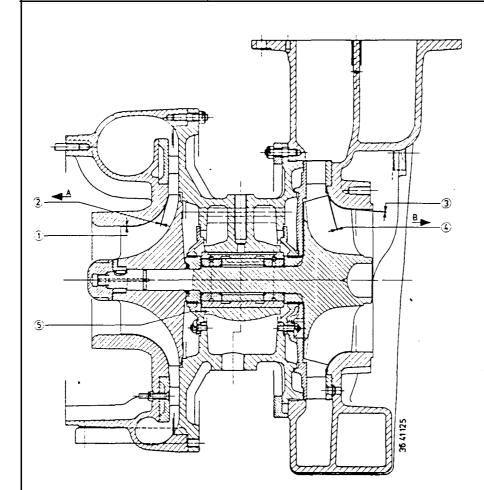
SEQUENCE OF OPERATION

- 1. Attach did gauge with holder in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial position.
- 2. Till the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
- 3. Recommended measures, especially when close to the upper Limit:

Measuring range [mm]	Remarks
to 1.05	Range of admissible transverse play (corresponds to the tolerances of the radial. bearing clearance for new turbochargers)
1.05 to 1.35	Inspection of single parts of the cartridge by specialized service personnet. during the next opportunity, Checking: Quality and pressure of the Lube oil.
above 1.35	Operating reliability endangered. Replace the respective parts through specialized service personnel. or exchange cartridge. Checking: Ouglity and pressure of the lube oil.

Note: Is there no possibilty to balance the rotor at site, we strongly recommend to let this do at first opportunity by the manufacturer or in a service station.

Otherwise, shortened life time of the bearings has to be expected.



Measure radial gaps ① and ③ using feeler (thickness) gauge, and axial gaps ② and ④ by means of soft metal imprint (lead wire). Always measure at 3 points on the circumference and calculate mean value.

Apply dial gauge to suitable axial surface and measure axial play@ of rotor by vigorously moving the rotor in the directions A and B. Remov obstructive materials from the labyrinth seal boreholes beforehand, if any. However, dc not remove wear tracks.

Position	Cosition			When New				Replace on re-	
18	Designation of Parts	Part No.	Gap		CI ea	rance	machine p	ants	
1;.			min.	max.	min.	nax.	nin,	лак.	
1	Impeller - Compress or casing, radial	520.005 544.001	0.50	0.60	-	_	0.40	0.70	
2	Impeller - Compress or casing, axia I	520.005 546.001	0.30 0.9	90	-	-	0.25	1.00	
3	Turbine rotor - Gas admission casing, radial	520.001 501 .001	0.50	0.5 7	-	-	0.40	0.70	
4	Turbine Gas admission casing, axial	520.001 501 .001	0.50 0.9	0		ı	0.40	1.00	
- 5	Bearing bush-Labyrinth Ring				0.20 0.	27	<u> </u>	0.33	

Admissible aberration from the plane of rotation (measured with dial gauge at largest radial distance)

Admissible transverse play of rotor in bearings

of the impeller

..... 0.06 mm

:See Work Card 500.06 .

+ measured with rotor pushed up in the direction A ++ measured with rotor pushed up in the direction

в }∗

* with the rotor pushed up in opposite direction,

withdraw measured axial play

(5)

9.87

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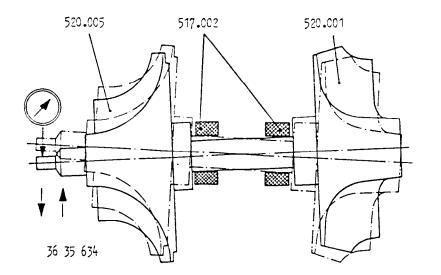
CHECKING ROTOR FOR TRANSVERSE PLAY (Bearing Clearance)

NR15/R

500

Arbeitskante-Nr. Work card No. Carte travail No. Tarjeta trabajo No.

500.06



TOOLS REQUIRED

- 1 Dial gauge
- 1 Dial gauge holder

LEGEND

517.002 Bearing bush 520.001 Turbine rotor 520.005 Compressor wheel

GENERAL

Judgement on condition of bearing by measuring transverse play is only possible in case of labyrinth seals already run in [after approx. 500 operating hours).

STARTING POSITION

Silencer or air intake casing and compressor casing removed, or cartridge removed.

SEQUENCE OF OPERATION

- 1. Attach d'ingauge with holder in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial. position,
- 2. Tilt the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
- 3. Recommended measures, especially when close to the upper limit:

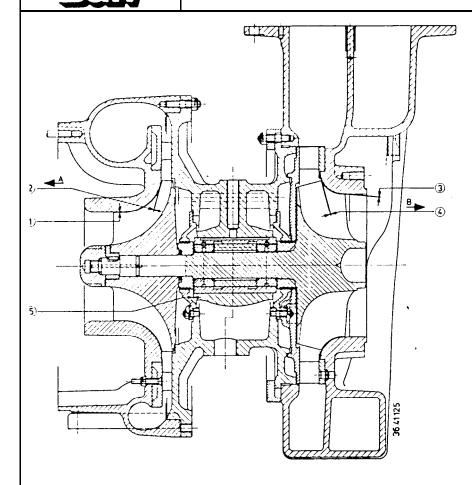
Measuring range [mm]	Remarks
to 0.85	Range of admissible transverse play (corresponds to the tolerances of the radial bearing clearance for new turbochargers)
0.85 to 1.10	Inspection of single parts of the cartridge by specialized service personnel during the next opportunity. Checking: Quality and pressure of the lube oil.
above 1.10	Operating reliability endangered. Replace the respective parts through specialized service personnel or exchange cartridge. Checking: Quality and pressure of the lube oil

<u>Note</u>: Is there no possibilty to balance the rotor at site, we strongly recommend to let this do at first opportunity by the manufacturer or in a service station.

Otherwise, shortened life time of the bearings has to be expected.

1





Measure radial gaps ① and ③ using feeler (thickness) gauge, and axial gaps ② and ④ by means of soft metal imprint (lead wire). Always measure at 3 points on the circumference and calculate mean value.

Apply dial gauge to suitable axial surface and measure axial play@ of rotor by vigorously moving the rotor in the directions A and B. Remov obstructive materials from the labyrinth seal boreholes beforehand, if any. However, dnot remove wear tracks.

osition			When New			Replace or re-		
in	Designation of Parts	Part No,	Gap		Clearance		machine parts	
'ig.			mi n.	max.	mi n.	max.	mi n.	max.
1	Impeller - Compressa casing, radial	520.005 546.001	0.50 0.6	0		 - 	0.40	0.7 0
2	Impeller -Compressor casing, axia i	520.005 546.001	0.30 0.8	80			0.25	0.9 0
3	Turbine rotor - Gas admission casing, radial	520.001 501 .001	0.50 0.5	57			0.40	0.7 0
4	Turbine Gas admission casing, axial	520.001 501.001	0.65	1.15			0.55	1.25
5	Bearing bush-Labyrinth Ring				0.22 0.	30	ı	0.36

Admissible aberration from the pl (measured with dial gauge at large

the plane of rotation of the impeller

uge at largest radial distance)......

0.06 m

Admissible transverse play of rotor in bearings

See Work Card 500.06.

+ measured with rotor pushed up in the direction A
++ measured with rotor pushed up in the direction B



* with the rotor pushed up in opposite direction,

withdraw measured axial play





CHECKING ROTOR FO R TRANSVERSE PLAY

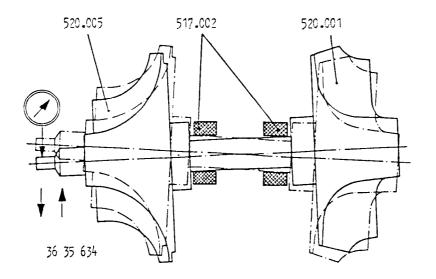
(Bearing Clearance)

NR20/R

500

Arbeitskante-Nr. Work card No. Carte travail No. Tanjeta trabajo Na

500.06



TOOLS REQUIRED

1 Dial gauge

1 Dial gauge holder

LEGEND

517.002 Bearing bush 520.001 Turbine rotor 520.005 Compressor wheel

GENERAL

Judgement on condition of bearing by measuring transverse play is only possible in case of labyrinth seals already run in (after approx. 500 operating hours).

STARTING POSITION

Silencer or air intake casing and compressor casing removed, or cartridge removed.

SEQUENCE OF OPERATION

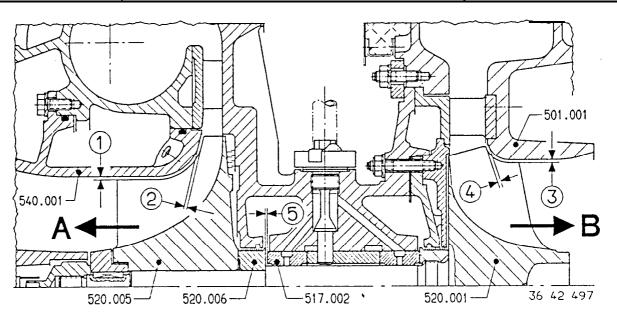
- 1. Attach dial. gauge with holder in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial position.
- 2. Tilt the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
- 3. Recommended measures, especially when close to the upper limit:

Measuring range [mm	Remarks
to 1.00	Range of admissible transverse $\rho \! \mid \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! $
1.00 to 1.25	Inspection of single parts of the cartridge by specialized service personnel during the next opportunity. Checking: Quality and pressure of the lube oil.
above 1.25	Operating reliability endangered. Replace the respective parts through specialized service personnel. or exchange cartridge. Checking: Quality and pressure of the lube oil.

Note: Is there no possibilty to bolonce the rotor at site, we strongly recommend to let this do at first opportunity by the manufacturer or in a service station.

Otherwise, shortened life time of the bearings has to be expected.

Gaps and Clearance s



Posn.No. in Illustrat.	Gesignation of Parts	(Part No.)		When new min [mm]	max [mm]	Replace or remachine min [mm]	
3 1	Compressor wheel Insert piece	(520.005) (540.001)	Radi al gap	0. 60	0. 70	0. 50	0. 90
3 2 +	Compressor wheel. Insert piece	(520,005) (540,001)	Axi al gap	0. 35	0.90	0. 30	1.00
33	Turbine rotor Gas-admission casing	(520.001) (501.001)	Rodiol gap	0. 60	0. 70	0. 50	0. 90
4 ++	Turbine rotor Gas-cdmission casing	(520.001) (501.001)	Axid gap	0.60	1.15	0.50	1.25
55	Bearing bush Labyrinth ring	(517.002) (520.0061	Avial clearance	0.26	0. 35		0. 42

Admissible aberration from the plane of rotation of compressor wheel Admissible transverse play of rotor in begrings.....see work card 500.06

Measure radial gaps \bigcirc and \bigcirc using feeler (thickness) gauge, and axial gaps \bigcirc 2 and (4) by means of soft metal imprint (lead wire]. Always measure at 3 points on the circumference and calculate mean value.

 $\operatorname{\mathsf{Appl}} y$ dial gauge to suitable axial surface and measure axial clearance 5 of ${}_0$ $\operatorname{\mathsf{rotor}}$ by vigorously moving the rotor in the directions

t Measured with rotor pushed up in the direct ion Measured with rotor pushed up in the direction

With the rotor pushed up in opposite direction, withdraw measured axial clearance

 0^{5}



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CHECKING ROTOR FOR TRANSVERSE PLAY (Bearing Clearance)

NR24/R

500

Arbeitskarte-Nr. Work card No. Carte travail No. Tanjetatrabajo **No.**

500.06

520.005 517.002 520.001 36 35 634

TOOLS REQUIRED

1 Dial gauge1 Dial gauge holder

LEGEND

517.002 Bearing bush 520.001 Turbine rotor 520.005 Compressor wheel

GENERAL

Judgement on condition of bearing by measuring transverse play is only possible in case of labyrinth seals already run in (after approx. 500 operating hours).

START ING POSITION

Silencer or air intake casing and compressor casing removed, or cartridge removed.

SEOUENCE OF OPERAT I ON

- **1.** Attach **dial gauge with holder** in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial position.
- 2. Tilt the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
- 3. Recommended measures, especially when close to the upper limit:

Measuring range [mm]	Remarks
to 1.05	Range of admissible transverse play (corresponds to the tolerances of the radial bearing clearance for new turbochargers)
1.05 to 1.35	Inspection of single parts of the cartridge by specialized service personnel during the next opportunity. Checking: Qualit and pressure of the lube oil
above 1.35	Operating reliability endangered. Replace the respective parts through specialized service personnet or exchange cartridge. Checking: Quality and pressure of the Lube oil.

Note: Is there no possibility to balance the rotor at site, we strongly recommend to let this do at first opportunity by the manufacturer or in a service station.

Otherwise, shortened life time of the bearings has to be expected.



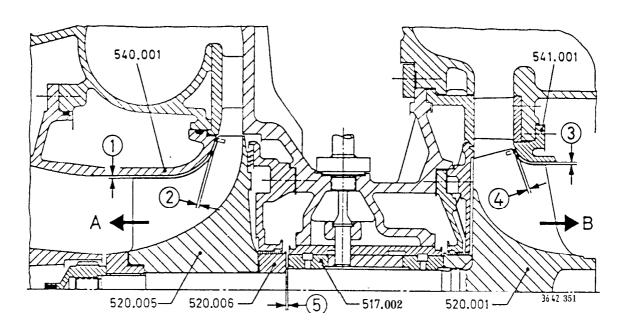
TECHNI CAL DATA

Gaps and Clearances

NR 26/R

52

1



Posn.No. in · Illustrat.	Designation of Parts (Part No.)	Whe	n new	Replace machine	parts
1	Compress.wheel (520.005) Radial Insert (540.001) gap	C. 65	0.70	0.50	0.90
2 +	Compress.wheel (520.005) Axial Insert (540.001) gap	0.35	0.95	0.30	1.15
3	Turbine rotor (520.001): Radial Insert (541.001) gap	0.60	0.70	0.50	0.90
<u>(4</u>) • +	Turbine rotor (520.001) Axial Insert (541.001) gap	0. 35	0.85	C. 33	1. 03
3	Bearing bush (517.002) Axial tabyrinth ring (520.006) clearand	C. 27	0. 35		0.42

Admissible transverse play of rotor in bearings; see work card 500.06.

Measure radial gaps (1) and (3) using feeler (thickness) gauge, and axial gaps (2) and (4) by means of soft metal imprint (lead wire). Always measure at 3 points on the circumference and calculate mean value.

Apply dial gauge to suitable axial surface and measure axial clearance (5) of rotor by vigorously moving the rotor in the directions A and B. Remove obstructive materials from the labyrinth seal boreholes beforehand, if any. tiowever, do not remove wear tracks.

- + Measured with rotor pushed up in the direction A),
- ++ Measured with rotor pushed up in the direction B)
 - * With the rotor pushed up in opposite direction, withdraw measured axial clearance 5.

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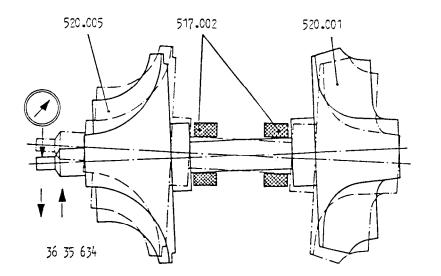
CHECKING ROTOR FOR TRANSVERSE PLAY (Bearing Clearance)

NR26/R

500

Arbeitskante-Nr. Work aard No. Cante travait No. Tanjeta trabajo Na.

500.06



TOOLS **REQUIRED**

1 Dial gauge1 Dial gauge holder

LEGEND

517.002 Bearing bush 520.001 Turbine rotor 520.005 Compressor wheel

GENERAL

Judgement on condition of bearing by measuring transverse play is only possible in case of labyrinth seals already run in [after approx. 500 operating hours).

START ING POSITION

Silencer or air intake casing and compressor casing removed, or cartridge removed.

SEQUENCE OF OPERATION

- 1. Attach dial. gauge with holder in such a way that the measuring pin of the gauge contacts the compressor end of the rotor shaft in the radial position.
- 2. Tilt the rotor shaft by hand vigorously in both directions perpendicular to its axis, while taking gauge readings which are to be noted down.
- 3. Recommended measures, especially when close to the upper limit:

Measuring range [mm]	Remarks
to 1.15	Range of odmissible transverse play (corresponds to the tolerances of the radial bearing clearance for new turbochargers)
1. 15 to 1. 45	Inspection of single parts of the cartridge by specialized service personnel. during the next opportunity, Checking: Quality and pressure of the lube oil.
above 1.45	Operating reliability endangered. Replace the respective parts through specialized service personnel or exchange cartridge. Checking: Quality and pressure of the lube oil.

Note: Is there no possibilty to bolonce the rotor at site, we strongly recommend to let this do at first opportunity by the manufacturer or in a service station, Otherwise, shortened life time of the bearings has to be expected.