

MAN TURBO AG.

Schweiz, Hardstrasse 305,
CH – 8005 Zurich

P.O.NO. : 4004662 Date : 26th January 2005

MAN TURBO AG. Material Code: 10301918.

Drawing No. : 04443-00. Rev-C.

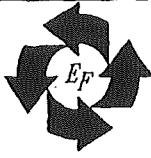
Coupling No. : 41496

Project : KOSAIR 2004

Installation, Operation and Maintenance Manual

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Model : 10GBH-330-S

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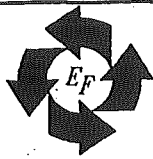
Coupling Drawing no : 04443-00. Rev-C
Customer : MAN TURBO AG Schweiz,
Customer Order ref. : 4004662. Dated January 26, 2005
Coupling Model : 10GBH-330-S
Coupling Number : 41496
Quantity supplied : 1 Number

Project. : Kosair 2004

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PREPARED	CHECKED	APPROVED	DATE
SURESH	SANKAR	KVMR	10-04-2005

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1. Coupling Description

The Euroflex coupling is of the dry laminated disc type in which flexibility is obtained through the deformation of the discs (blades) in the disc pack (flexible element). The disc packs are separated by a central spacer comprising of one or more sections. There are limitations to the amount of deformation or misalignment that the disc packs can withstand in both the axial and angular directions. These limits are specified for the coupling and care should be taken to ensure that these are not exceeded.

The individual discs are of a regular outer polygonal profile and are assembled into packs of designated thickness and normally secured by bushes. Torque transmission and flexibility is accomplished by connecting the disc packs (element assemblies) through the bushed holes, on a common bolt circle diameter, by means of bolts which are alternatively fixed to the driving and driven machine components.

The bolts, bushes and associated holes are manufactured to very tight tolerances. However, due to the need for practical assembly the fits of the bushes & bolts are such that slight clearance with holes may be possible. To compensate for these clearances and to ensure that the components adjacent to the disc packs remain concentric the bolt circle diameter on the flanges is made slightly greater than that of the disc packs. Hence there is a slight 'stretch' of the disc pack upon assembly.

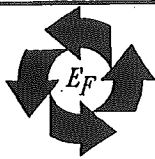
The bolts are tightened on assembly to a relatively high level to give a significant pre-load. This pre-load is important to prevent any slip of the interfaces during operation and to eliminate any bolt bending due to the overhung moment induced when transmitting torque. As such the tightening of the bolts should be considered as important. In general the principles of the design are identical to many units already operating.

2. Operating Conditions and Limits

During operation the disc packs are subject to significant levels of both tensile and bending stresses resulting from the imposed torque, speed and misalignments. These stresses are all inter-related with a change in the level of one affecting the permitted limits of the other. In normal cases with steady torque & speed this relationship focuses on the levels of misalignment. As such, changes in the level of axial deflection will alter the permitted level of angular misalignment. It is, hence, very important that the misalignments imposed on the coupling remain, under all operating conditions, within the maximum allowance as stated in the final engineering data for the coupling (normally in the form of a 'Curve of Allowable Misalignments').

The initial misalignment should be as accurate as possible and within the alignment limits given in the Alignment &/or Installation Instruction sections of this document. Keeping these initial limits as low as possible allows for greater movement (intended or accidental) during the operation of the machinery.

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As stated in the previous section, the level of pre-load in the main coupling bolts is important and, as such, torque tightening of the bolts should be done with care and to the levels of torque or stretch specified on the coupling assembly drawing or in the Installation Instruction section of this document.

Since the coupling is designed & selected to meet the specific requirements of an application it is important that all conditions of torque, speed, environment, etc. remain as originally specified.

Installation, Operating & Maintenance Manual**3. General Notes (Do's & Don'ts)**

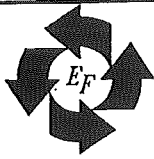
- It is essential that all instructions outlined in this document are carried out by competent, trained, personnel. Should any problems be anticipated or encountered please contact Euroflex for advice or to arrange a site visit by a member of our engineering staff. Repairs & overhauls can, alternatively, be undertaken in one of our works.
- Prior to performing any installation, inspection or maintenance work it is essential that the power supply to the machines be isolated to prevent any accidental movement of rotating machinery. Any additional measures to prevent rotation that are fitted to the machinery adjacent to the coupling should be applied.
- This product is designed and intended for a specific purpose. It is vital that it is not used for any purpose other than for which it was originally designed and supplied and that the limits of its capacities, as detailed here or in any other document, are not exceeded.

No liability will be accepted and any other warranty, either expressed or implied, will be null and void should any component of whatever kind, including nuts, bolts & washers, be used in the assembly, or modifications be made to all or part of the product which are not supplied, specified or agreed by Euroflex.

Do's

- The following instructions must be read and fully understood prior to starting any assembly or maintenance work on the coupling,
- Ensure, prior to fitting, that all components are clean and free from any dirt, etc.
- When installing the coupling it is important to ensure that it is supported at all times and does not 'hang' from one disc pack.

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Where hub/shaft connections require a standard interference fit the hubs may be heated in oil to between 200 & 250 Celsius and rapidly positioned onto the shaft. It is essential that the heat is evenly applied and that spot heating is avoided.

Don'ts

- Do not use any component in the assembly of this coupling that is not supplied or approved by Euroflex.
- Do not attempt, where the unit mass is excessive, to lift the coupling without the use of lifting equipment.

These couplings will, normally, have been supplied in a balanced condition. Striking, rolling, dropping, etc. of the coupling may disturb this balance and must be avoided at all times including transport, storage and installation.

4. Installation Instructions

General Notes

No liability will be accepted and any other warranty, either expressed or implied, will be null and void should any component of whatever kind, including nuts, bolts & washers, be used in the assembly, or modifications be made to all or part of the product which are not supplied, specified or agreed by Euroflex.

For general safety, alignment and maintenance instructions see relevant sections of this document.

Important

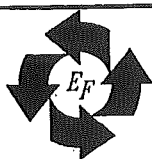
All tightening bolts/nuts and screws should be done evenly (cylinder head fashion) to 50% & then 100% of the stated torque. Threads should be lubricated with Molybdenum Disulphide grease or equivalent.

Installation Instructions

Important note- The main coupling bolts & nuts (items 3 & 6) are tightened by Euroflex and need not be disturbed for installation. Under normal circumstances these should NOT BE TOUCHED since this may affect the balance of the unit.

1. Disassemble the motor hub(item 1) adaptor #3 (item no.11), by removing attachment bolts and nut (Item 10 & 9).

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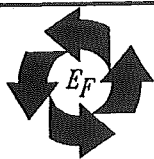
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2. Fit the motor hub(item 1) on motor shaft and adaptor#2 (item no.11) on gearbox flange respectively.
3. Fit the Attachment Bolts & Nuts (items 13 & 14) to connect the flanges of gearbox and adaptor #3 (items 11) and Torque Tighten (Cylinder Head Fashion) to the value shown on the drawing, ensuring that the threads are correctly lubricated. Care will have to be when tightening these nuts to make sure that the registers are drawn together correctly.
4. Position the driving and driven machinery and check the distance between the motor hub flange face and gearbox flange face is 798 mm +/-1.5mm and Record this distance (reference this as dimension L) [The +/-1.5mm is the variation that can be accommodated by the axial adjustment shims. A more accurate initial alignment will assist if the turbine rotor has to be changed in the future].
5. Check the alignment of the shafts is within the limits defined in the alignment section of this document.
6. Calculate the number of Axial Adjustment Shims (items 10) that will be required during the installation of the coupling as $N = (L-798)/0.381$ where L is the recorded length from section 3 above. The Number of shims N should be rounded to the nearest integer.
7. Both ends of the coupling may have been shipped with the Gaging Screws & Bushes (items 15 & 16) fitted over the Element Assemblies (items 3). At this point remove the screws & bushes, store the bushes(items 15) for future use and refit the screws (items 16).
8. Tighten the Gaging Screws (items 16) at both ends of the coupling to compress each Element Assembly by around 3 to 4mm.
9. Place the transmission unit into the position between the motor hub and adaptor #3 ensuring that the spigots on hub and adaptor #2 clear the locating diameter on the respective adaptors.
10. REMOVE ALL Gaging Screws (items 16) from BOTH ENDS of the Coupling and store for future use. As the screws are removed the compression of the Element Assemblies will be relieved and the adjacent flanges on hub and adaptors will move together. It is important to ensure that as this happens the registers locate correctly.
11. Fit the Attachment Bolts & Nuts (items 10 & 9) to connect the flanges of adaptor #1 & #2 (items 6 & 9) and Torque Tighten (Cylinder Head Fashion) to the value shown on the drawing, ensuring that the threads are correctly lubricated. Care will have to be when tightening these nuts to make sure that the registers are drawn together correctly.

Removal Instructions

Coupling removal is a reverse of the above installation procedure.

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5. Installation Alignment Instructions

Whilst Euroflex disc couplings will accept significant levels of misalignment the actual levels vary according to the configuration, design & operating conditions for each unit. The maximum allowable operating misalignments (axial & angular/radial) are given in the final engineering data for the coupling. The limits are, generally, reserved for operation NOT for initial set-up. The initial set-up limits below are intended to allow operational movement of the machinery.

Method Of Alignment

Every company has its own preference as to the method it uses for alignment, most of which are well documented internally or freely available in documents or books. As such, it is not our intention to outline any specific method for alignment of the machinery. The following are guidelines on rapid checking of alignment suitable after installation and for general maintenance checks. However, the set-up values indicated can be used for guidance when using any alignment method.

Axial

Suggested limits for axial set-up distance may be specified in the unique installation instruction for the coupling. If not then the following may be used as a guide to the maximum length variations for the different bolt configurations of coupling:

6-bolt couplings: +/- 0.25mm

8-bolt couplings: +/- 0.20mm

10-bolt couplings: +/- 0.15mm

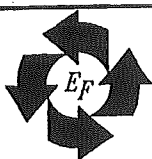
These levels may, in certain cases, be exceeded and, if no reference is made in the specific installation instructions, reference may be made to Euroflex Transmissions.

Angular / Radial / Parallel

Having aligned the machinery shafts using one of the established techniques, the coupling may be installed as per the instructions. It is then worth performing a check to establish that the overall alignment is correct for the specific coupling. This may, simply, be performed by one of the following two methods:

- Attach a dial indicator securely to the back of one of the coupling flanges, with the needle in contact with the flange face the other side of the disc pack (flexible element) as near the outside periphery as possible. Rotate the machinery & coupling and locate the minimum reading position. At this position, set the dial reading to zero. Rotate the machinery again and record the maximum reading over 360 degrees. Divide the value of this maximum reading by the coupling flange diameter to gain a value in mm/mm, which

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should be no greater than that shown in the following list. (This should be repeated at both disc packs (flexible elements) in a spacer coupling).

- An alternative method is, where possible, to accurately measure the distance across the flanges which sandwich the disc pack (flexible element) to obtain a maximum and minimum value. The difference between these two values should be divided by the flange outside diameter to obtain a value in mm/mm, this being no greater than that shown in the following list. (This should be repeated at both disc packs (flexible elements) in a spacer coupling).

6-bolt couplings - 0.0020 mm/mm
8-bolt couplings - 0.0015 mm/mm
10-bolt couplings - 0.0010 mm/mm

NOTE: These values are intended as guides only and, in certain cases, may be exceeded. IF IN DOUBT, CONTACT EUROFLEX TRANSMISSIONS.

6. Maintenance Instructions

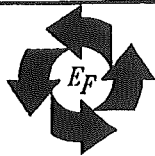
General maintenance of the disc couplings consists of an annual (or other agreed period) check of the following:-

- Check on axial and radial alignment to ensure that these are still within the allowable misalignment figures for the coupling.
- A visual examination of the discs for signs of fatigue cracking local to the washers (anchoring points). Slight bowing, separation of the individual discs between the washers or 'S' shaped distortion of the laminations is not detrimental.
- Check that all bolts, nuts and screws are correctly tightened.

NOTE: Requirements for spare parts should be made to Euroflex, or a local authorised outlet, stating as many of the following as possible:

- Original Purchaser of the coupling
- Original Order Number
- Coupling Serial Number [Serial number will, normally, be etched on the major coupling flanges]
- Coupling Drawing Number

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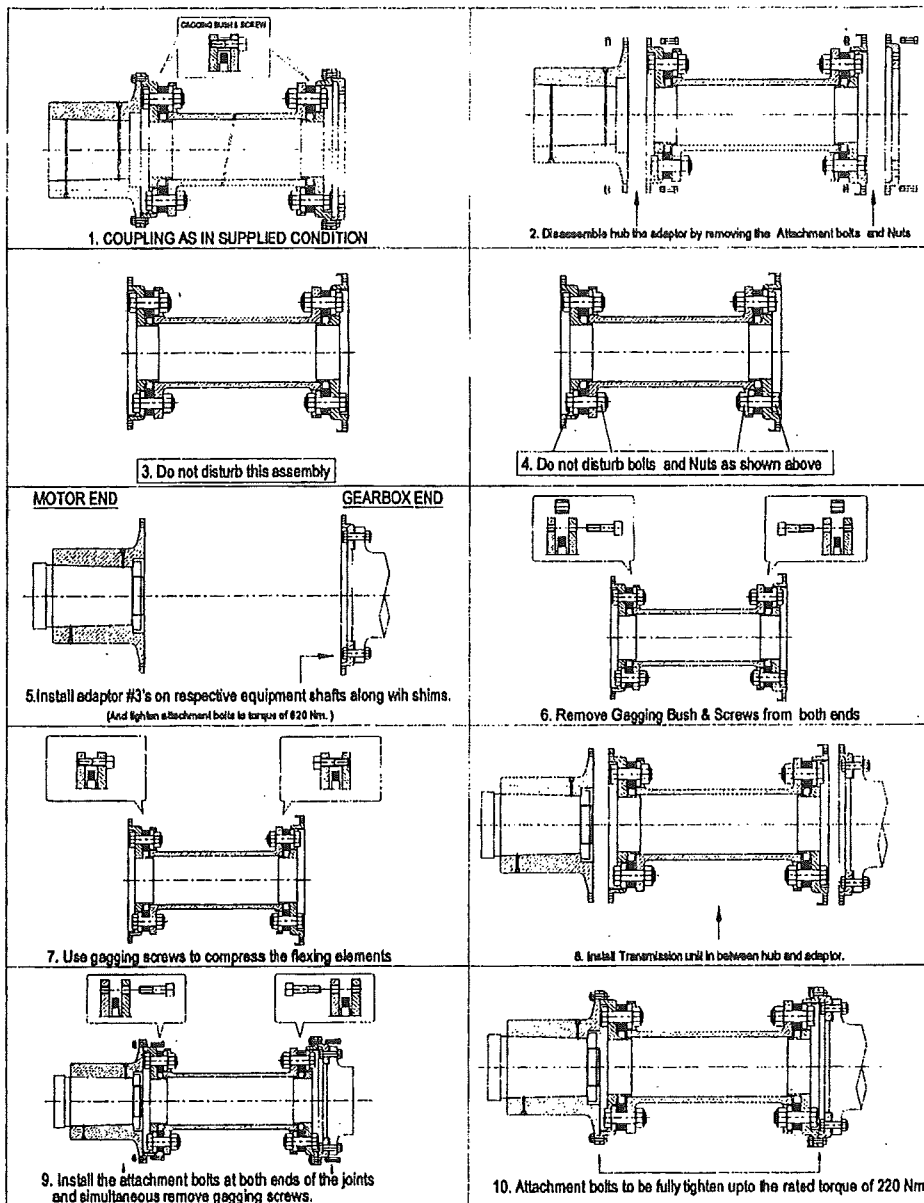


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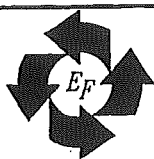
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Drg No : 04443-00 INSTALLATION PROCEDURE



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9. Contact Details

If you have any questions, encounter a problem, would like further information or would like to book a sit visit please contact one of the following:

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