

COUPLING SERVICES LTD

DISC COUPLING INSTALLATION OPERATING AND MAINTENANCE MANUAL

COUPLING TYPE: CSD

CONTENTS

1. COUPLING DESCRIPTION
2. OPERATING CONDITIONS & LIMITS
3. GENERAL NOTES (DO'S & DON'TS)
4. INSTALLATION INSTRUCTIONS
5. INSTALLATION ALIGNMENT INSTRUCTIONS
6. MAINTENANCE INSTRUCTIONS
7. PERMITTED OPERATIONAL MISALIGNMENTS
8. CONTACT DETAILS

1: COUPLING DESCRIPTION

The **Coupling Services** Disc Coupling is of the dry laminated disc type in which flexibility is obtained through the deformation of the discs in the disc pack. The disc packs are separated by a central spacer. 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. Torque transmission and flexibility is accomplished by connecting the disc packs through the holes, on a common bolt circle diameter, by means of bolts which are alternatively fixed to the driving and driven machine components.

The bolts and associated holes are manufactured to very tight tolerances. However, due to the need for practical assembly the fits of the 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. For CSD type units the Main Coupling Bolts & Nuts - those that fix the Disc Pack to the Adjacent Components - are PRE-TIGHTENED BY COUPLING SERVICES – AND SHOULD NOT NORMALLY BE DISTURBED!

The central section of the coupling (that between the hubs) that constitutes the pre-assembled unit is known as the "TRANSMISSIONS UNIT".

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, therefore, 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 AND INDICATED IN Section 7 of this document.

The initial misalignment should be as accurate as possible and within the alignment limits given in the "Installation Alignment Instruction" section (Section 5) of this document. Keeping these initial limits as low as possible allows for greater movement (intended or accidental) during the operation of the machinery.

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.

3: GENERAL NOTES

3.1: General Guidelines

- 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 **Coupling Services Ltd** for advice or to arrange a site visit by a member of our engineering staff. Repairs & overhauls can, alternatively, be undertaken in 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 that 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 **Coupling Services Ltd**.

3.2: 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, burrs, etc. (specifically those areas which form mating surfaces or registers).
- Gaging Screws & Bushes should always be in place during transportation of the coupling when not installed on machinery.
- When installing the coupling it is important to ensure that it is supported at all times and does not 'hang' from one disc pack.
- Match mark alignments to be in line when unit is full assembly is balanced.
- 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.

3.3: Don'ts

- Do not use any component in the assembly of this coupling that is not supplied or approved by **Coupling Services Ltd**.
- 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

4.1: Coupling type

These Instructions are specific to the coupling stated below:

COUPLING: CSD Type.

4.2: 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 **Coupling Services Ltd.**

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 60% & then 100% of the stated torque. Threads should be lubricated with Molybdenum Disulphide grease or equivalent.

All Faces, Registers & Holes should be clean & free from burrs before starting the assembly procedure.

4.3: INSTALLATION INSTRUCTIONS

IMPORTANT NOTE – The main coupling bolts & nuts at both ends are tightened by **Coupling Services** and need not be disturbed for installation. Under normal circumstances these should NOT BE TOUCHED since this may affect the balance of the unit.

- a) Position the driving and driven machinery and check the alignment of the shafts is within the limits defined in the alignment section of this document.
- b) The Coupling may have been supplied completely assembled. The next step is to separate the Hubs from the “Transmissions Unit”.
- c) Remove the Attachment Screws & Lock washers and store safely.
- d) Fit the hubs to the relevant shafts making sure that the shaft is correctly positioned in the hub. It is usual for the shaft to be flush with the hub flange face BUT the assembly drawing and/or supplier notes should be checked to ensure the correct positioning.
- e) At this stage check the **AXIAL ALIGNMENT of the machines – See Sections 5.3 below.**
- f) The Transmission Units will have been supplied with gagging screws & bushes. These should be removed and the bushes stored for future use.

- g) Refit the Gagging Screws at both ends of the coupling Transmissions Unit and evenly tighten (cylinder head fashion in stages so as not to introduce excessive angle into the element assembly) to compress each Disc Pack by between 2.0 & 2.2mm to allow installation of the Transmission Unit between the Hubs.
- h) Position the Transmissions Unit between the Hubs and Align Match Marks on Hub Flanges with the Match Marks on the Flanges of Transmissions Unit Adaptors. Rotate the machinery as necessary to achieve this.
- i) Fit the Attachment Bolts with the Lock washers to connect the Hubs to the Transmissions Unit. DO NOT TIGHTEN AT THIS STAGE.
- j) Carefully & evenly loosen the Gagging Screws to release the compression in the coupling and allow the Transmission Units to fit into the recesses of the Hubs ensuring that the faces mate and the registers seat correctly.
- k) Remove the Gagging Screws completely and store for future use.
- l) Finally Torque Tighten the Attachment Screws to the torque indicated on the drawing CYLINDER HEAD FASHION in 2 stages (60% & 100% torque)

4.4: REMOVAL INSTRUCTIONS

Coupling removal is a reverse of the above installation procedure.

5: INSTALLATION ALIGNMENT INSTRUCTIONS

5.1: General Note

Whilst **Coupling Services** 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 shown in Section 7 below. **These 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.

5.2: Methods 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.

5.3: AXIAL ALIGNMENT LIMIT

Suggested limits for axial set-up distance for this coupling is +/-0.25mm.

This limit may, in certain cases, be exceeded but in this case reference must be made to Coupling Services Ltd.

5.4: AXIAL ALIGNMENT CHECK

- a) Measure the distance between the flange faces over each disc pack at the outer edge at 4 places (0/90/180/270 degrees) using a vernier gauge or internal micrometer.
- b) The mean of the distances should be $\pm 0.25\text{mm}$.
- c) If these limits are exceeded in any way then the procedure should be halted and the units re-aligned.

5.5: ANGULAR / RADIAL / PARALLEL ALIGNMENT & LIMITS

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:

- a) Attach a dial indicator securely to the back of the Spacer flange at one end of the coupling (using a magnetic base), with the needle in contact with the flange face of Adaptor the other side of the disc pack as near the outside periphery as possible.
- b) Rotate the machinery & coupling and locate the minimum reading position. At this position, set the dial reading to zero.
- c) 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 should be no greater 0.002mm/mm.
- d) Repeat the process at the other end of the coupling.
- e) If the limits are exceeded at either end then the process should be halted and the machines re-aligned & re-positioned.

ALTERNATIVE METHOD

- a) An alternative method is, where possible, to accurately measure the distance between the faces which sandwich the disc pack to obtain a maximum and minimum value using Slips, an Internal Micrometer or an Accurate Vernier.
- b) 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 0.002mm/mm.
- c) This should be repeated at the other disc pack.
- d) Again, if the limits are exceeded then the process should be halted and the machines re-aligned & re-positioned.

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

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 (See Section 5).
- 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.

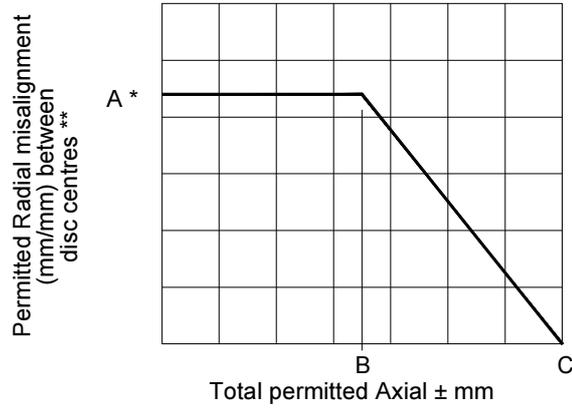
NOTE: Requirements for spare parts should be made to **Coupling Services Ltd**, or a local authorised outlet, stating as many of the following as possible:

- 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

7: PERMITTED OPERATIONAL MISALIGNMENTS

CSD	60	80	100	120	140	160	180	200	220	8220
A mm/mm	0.0115	0.0115	0.0115	0.0115	0.0115	0.0115	0.0115	0.0115	0.0115	0.0078
B mm	0.75	0.90	1.25	1.50	1.70	1.50	1.90	2.50	2.50	1.25
C mm	1.70	2.10	2.70	3.25	3.75	4.50	5.00	5.50	6.00	3.75
X mm	29.7	37.8	46.6	54.7	62.9	71.6	79.75	89.3	98.1	98.1

* 0.0115mm/mm Radial Misalignment relates to 0.66° per end
0.0078mm/mm Radial Misalignment relates to 0.45° per end
** Distance between Disc Centres = DBSE - X mm



8: 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:

COUPLING SERVICES LTD,
Unit 1.3 Pioneer Way
Lincoln,
Lincolnshire,
LN6 3DH
ENGLAND

Tel: +44 (0)1152 688088
email: sales@couplingservices.co.uk