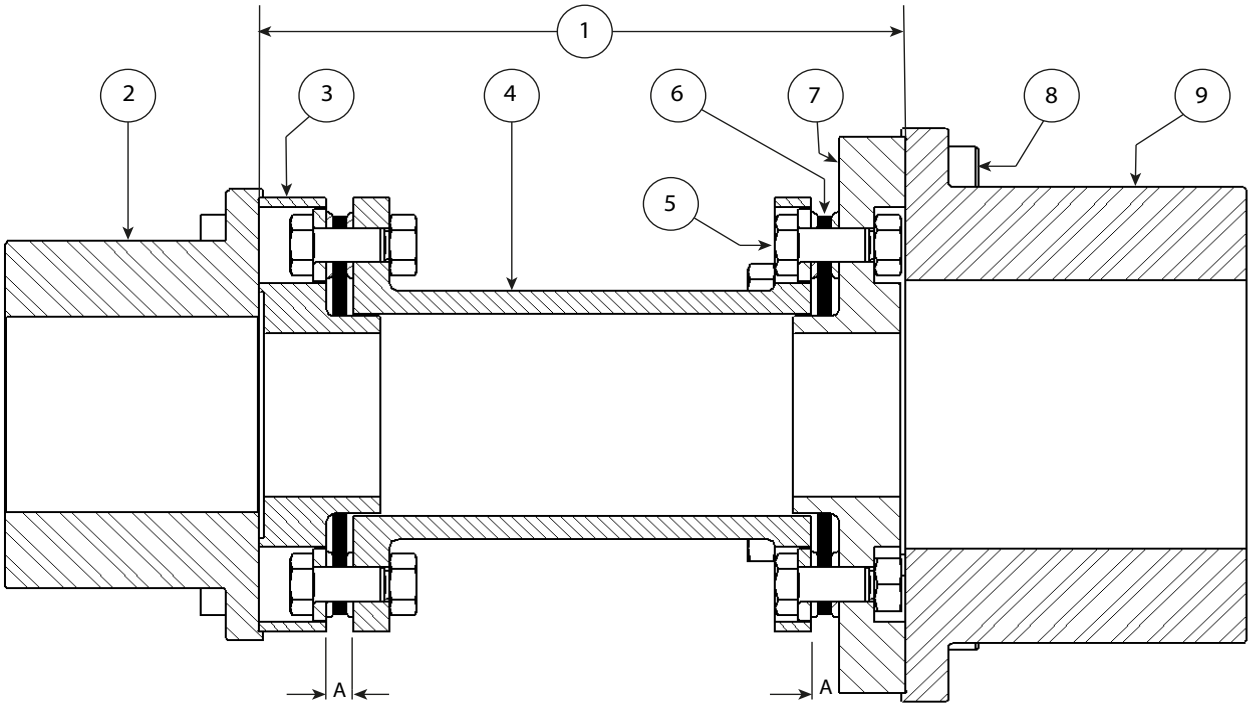
TLKS

METASTREAM® T-SERIES FLEXIBLE MEMBRANE COUPLING FOR API APPLICATIONS

Installation, Operation & Maintenance Instructions

FIGURE 1



1 – Transmission unit
2 – Standard hub -external location
3 – Standard Guard ring
4 – Coupling spacer
5 – Drive-bolt assembly (drive bolt, locknut, washers and overload collar)
6 – Membrane pack
7 – Extended Guard ring
8 – Hub Bolt
9 – Extended hub -external location [sizes 0300 - 2000]

Foreword

These instructions are provided to familiarise the user with John Crane's Metastream TLKS coupling and its designated use. These instructions must be followed whenever work is carried out on the coupling and should be kept available for future reference.

ATTENTION These instructions are for the fitting, operation and maintenance of the coupling as used in rotating equipment and will help to avoid danger and increase reliability. The information required may change with other types of equipment or installation arrangements. These instructions must be read in conjunction with the instruction manuals for both the driver and driven machinery.

If the coupling is to be used for an application other than that originally intended or outside the recommended performance limits, John Crane must be contacted before its installation and use.

Any warranty may be affected by improper handling, installation or use of this coupling. Contact John Crane for information as to exclusive product warranty and limitations of liability.

If questions or problems arise, contact your local John Crane sales/service engineer or the original equipment manufacturer, as appropriate.

ATTENTION John Crane couplings are precision products and must be handled appropriately. Take particular care to avoid damage to spigots, mating faces, hub bores, keyways and membranes. Do not excessively compress the coupling membranes during assembly. Refer to Table 1 for compression limits (Min gap 'X').

These instructions are written for standard catalogue products, generally designed in accordance with the drawing shown.

Safety Instructions

The following designations are used in the installation instructions to highlight instructions of particular importance.

IMPORTANT is used for items of particular concern when using the coupling.

ATTENTION where there is an obligation or prohibition concerning the avoidance of risk.

⚠ **Where there is an obligation or prohibition concerning harm to people or damage to the equipment.**

The usual extent of supply comprises:

- A factory-assembled transmission unit (1) comprising
  - 2-off guard rings (3, 7)
  - 1-off spacer (4)
  - 2-off membrane packs (6)
  - 16-off drive bolt assemblies (5) *consisting of drive bolt and nut, overload collar and washers*
- Driver hub (2, 9)
- Driven hub (2, 9)
- 2 sets of hub bolts (8) to secure the transmission unit between the two hub flanges

IMPORTANT If a general arrangement drawing is supplied with the coupling, then all data indicated on that drawing takes precedence over information included in these instructions.

Storage

If the coupling is not to be used immediately, it should be stored indoors or in a waterproof container away from direct heat in its original packing.

Transmission units should be stored in a horizontal orientation to prevent any unnecessary load on the membranes.

All documentation supplied with the coupling should be retained for future reference.

Spares

When requesting spares, always quote the full designation of the coupling (e.g., TLKS-0500-0177-1500 or TLKS/0500/KA/GA-123456).

The following spares can be purchased from John Crane:

- Set of hub bolts (8) ***please specify standard and/or extended hubs***
- Hubs, bored to your requirement or unbored (2, 9)
- Complete transmission unit, balanced or unbalanced (1)
- Guard ring assembly (O=kit), including
  - Membrane pack (6)
  - 8-off drive bolt assembly (5) *consisting of drive bolt and nut, overload collar and washers*
  - Guard ring (3, 7)

Installation

Remove the coupling from the packaging and carefully inspect for signs of damage. Pay particular attention to the hub bores and the spigot/recess location features, which should be free from burrs and other damage.

Installation of hubs

Prior to installing the coupling, ensure that the machinery is made safe. Hubs must be adequately supported during installation to avoid accidental damage should they slip.

Parallel bore with keyed drive

1. Ensure the hub bore and mating shaft are clean. Hub bores that are supplied to finished size will have a protective coating applied to the bare metal surfaces, this needs to be removed with a solvent based cleaner prior to assembly. John Crane recommends Stanvac Z939 Bearing Solvent or similar.
2. The hub is usually installed with the hub face and shaft end flush.
3. Measure the shaft diameter and hub bore to confirm the correct fit.
4. For clearance fits, install the key(s) into the shaft keyway and with a little lubrication on the shaft, slide the hub onto the shaft. The key should be a tight sliding fit in the keyway with a small clearance at the top of the key. Secure the hub to the shaft in the correct axial position with one or more grub screws.
5. John Crane recommends a light interference fit for most applications, and it may be necessary to apply heat to assist fitting of such hubs. A warm oil bath or oven will usually be adequate. DO NOT spot heat or exceed 250°C / 482°F as this may cause distortion. A thermal heat stick can be used to estimate the temperature before quickly sliding the hub onto the shaft. A suitable stop will ensure the correct axial position is located.

Taper bore with keyed drive (see Figure 2)

1. Thoroughly clean all contact surfaces and smear the tapered surfaces with oil.
2. Fit the hub onto the shaft without the key(s). Lightly hammer the hub with a soft-faced mallet to ensure metal-to-metal contact takes place.
3. Measure the distance from the end of the shaft to the face of the hub using a depth micrometer (record this measurement).
4. Securely mount a dial gauge onto the inboard hub flange and set to zero.
5. Remove the hub and fit the key(s), which should be a tight sliding fit in the keyway with a small clearance at the top of the key.
6. Refit the hub and pull-up the shaft to the correct axial position indicated by the dial gauge. Based on the amount of interference the hub may have to be heated, in this case a warm oil bath or oven will usually be adequate. DO NOT spot heat or exceed 250°C / 482°F. A thermal heat stick can be used to estimate the temperature before quickly sliding the hub onto the shaft. Refer to coupling drawing for taper hub interference and pull-up (dial gauge value) dimensions.
7. If the hub has been heated, allow it to cool. Re-measure the distance from the end of the shaft to the face of the hub to confirm the correct axial position.
8. Fit the shaft-end retaining nut if applicable to ensure the hub is locked in position axially.

NOTE: *The hub face may not be flush with the shaft end when taper bores are used.*

Taper hubs mounted by oil injection (see Figure 2)

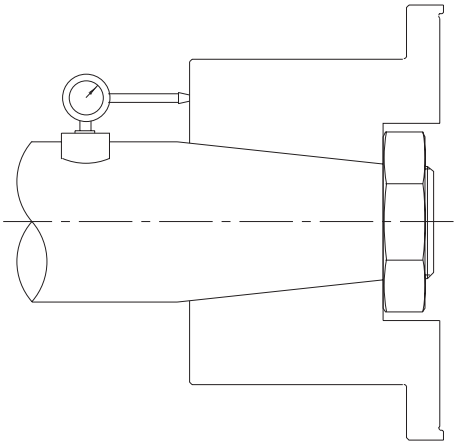
1. Ensure that all hydraulic bore and shaft features are well rounded and free from burrs.
2. Thoroughly clean all contact surfaces and smear the tapered surfaces with oil.
3. Fit the hub onto the shaft. Lightly hammer the hub with a soft-faced mallet to ensure metal-to-metal contact takes place.
4. Measure the distance from the end of the shaft to the face of the hub using a depth micrometer (record this measurement).
5. Securely mount a dial gauge onto the inboard hub flange and set to zero.
6. Fit the oil injection equipment, axial stop and mounting tools. Consult the arrangement drawing and the oil injection system suppliers' instructions.

Fit and secure the axial ram or hydraulic nut BEFORE injecting oil between the components.

7. Inject oil into hub bore junction until the required mounting pressure is reached, or it leaks out at the ends of the mating surfaces.
8. By means of the mounting tools, draw the hub up the shaft to the correct axial position, injecting oil during this operation.

   NOTE: *The correct pull-up distance should be shown on the assembly drawing.*
9. Release the oil pressure from the hub bore junction only and leave equipment fitted for one hour to allow for oil to drain from mating surfaces.
10. Release the oil pressure from the installation tooling and remove the mounting tool, axial stop, and oil injection equipment.

FIGURE 2



11. Remeasure the distance from the end of the shaft to the face of the hub to confirm the correct pull-up.
12. Fit the locking washer and shaft-end retaining nut if applicable.

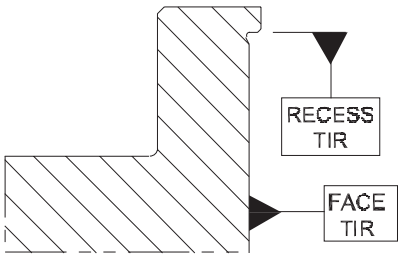
WAIT for 3-4 hours before applying torque.

Unbored hubs

John Crane recommends a light interference fit for keyed hubs and shafts (e.g. a H7/s6 fit). The finished bore size can be calculated from the measured shaft diameter.

When setting up the hub to machine the bore use the hub location recess and face as datum surfaces, as shown in Figure 3.

FIGURE 3



The hub face should be set such that the maximum runout does not exceed 0.025 mm (0.001") TIR. The hub location recess should be set so the maximum runout does not exceed 0.012 mm (0.0005")TIR. Please note that for API 671 applications the required tolerances will be tighter.

Adapters

For machines having an integral flanged shaft, the flange may be machined to suit the bolting configuration of the coupling transmission unit. Alternatively, the coupling may be supplied with a customized flange adapter. Refer to the specific general arrangement drawing for location and mounting details.

Shaft Alignment

Align the centre lines of the driving and driven machine shafts as follows:

1. Move the equipment into position.
2. Check for any soft foot and correct before commencing alignment.
3. With one machine firmly bolted down, set the distance between shaft ends (DBSE) according to the drawing or catalogue dimension.

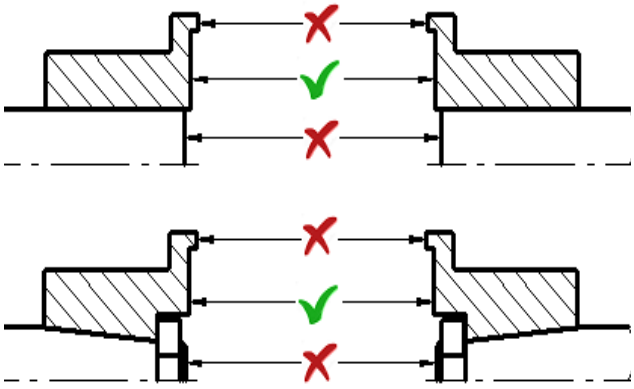
IMPORTANT DBSE should be measured between the inner face of the hubs and should not be taken as the length of the transmission unit at its outer periphery. DBSE may not be equal to the precise distance between shaft ends. In particular, the faces of taper-bored hubs may not be flush with the shaft end (refer to Figure 4).

4. Align the shaft centre lines both horizontally and vertically, ideally using the shafts. However, if access prohibits this then align using the hub bosses or flanges. John Crane recommends the reverse periphery method for accurate alignment. This can be done using dial gauges or with a laser shaft alignment kit. Further details on recommended laser alignment vendors are available from John Crane on request.
5. Recheck the DBSE after the shafts have been aligned.
6. Axial shims (together with a shim carrier in some cases) may be supplied on applications where it is difficult to accurately set a predetermined shaft end separation (DBSE). This is often the case where one or both of the hubs are taper bored. Where this feature is supplied, the thickness of shims (plus carrier, if applicable) are added to the free length of the transmission unit so that the combined length is equal to the measured distance between the hub flange faces, making any allowance for known shaft movements.

NOTE: *Ensure transmission is not compressed when taking this measurement.*

IMPORTANT The misalignment tolerances quoted in literature and on drawings allow for dynamic conditions and variations. For the best service from the coupling, John Crane recommends that installed misalignment is no more than 10% of the maximum allowable misalignment, with allowance being made for any anticipated movements which will occur during operation (e.g., thermal movements on hot pumps).

FIGURE 4



Installation of the Transmission Unit

1. Check spigot and recess locations on the hubs and transmission unit for damage.

The transmission unit must be adequately supported during installation to avoid accidental damage should it slip.

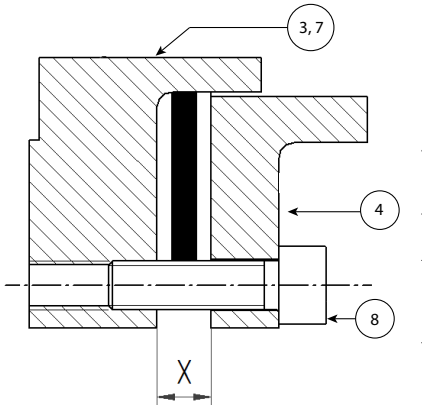
2. Compress the transmission unit then slide it between the hubs. To allow for compression using hub bolts (8), the spacer flanges (4) are drilled to allow the bolts to be threaded into the guard ring (3, 7) as shown in Figure 5 below. For DBFF's less than the preferred minimum, spacer flanges are slotted. Tightening evenly, compressing the transmission unit until clearance between the hub spigots and transmission unit length is achieved, allowing installation. Do not over compress the transmission unit as this can damage the metal membrane elements. The minimum gap 'X' (see Figure 5) should not be less than the values shown in Table 1, unless indicated otherwise on the general arrangement drawing.

IMPORTANT Always remove the compression bolts as soon as the transmission unit is in position.

3. Align the hub/transmission unit flanges if they have been match marked.
4. Fit the hub bolts by hand initially, then tighten evenly to locate the transmission unit, ensuring the spigots enter their recesses squarely. Using a torque wrench tighten in a "diametrically opposite" sequence to the torque values shown in Table 1 (tightening torque relates to lubricated bolts).
5. Measure dimension 'A' (see Figure 1) on the transmission unit. Check against the nominal value with the +/- tolerance applied, both of which are given in Table 1 on page 6 If outside these limits, redo the axial alignment.
6. Rotate the machinery two or three times slowly to ensure it moves freely.

Maximum angular misalignment = 0.33 degrees to 3600rpm and 0.25 degrees above 3600rpm.

FIGURE 5



Operation, Inspection and Maintenance

Before starting the machinery, ensure that all necessary safety procedures are being observed.

Routine examination should include a periodic check on the tightness of fasteners and visual inspection of transmission unit components for signs of fatigue or wear.

User must ensure coupling is protected against impacts and ingress.

If the coupled machinery is disturbed at any time, shaft alignment should be rechecked. Alignment checking is recommended if a deterioration of installation alignment during service is suspected.

Maintenance work must only be carried out by suitably qualified personnel when the equipment is stationary and has been made safe.

John Crane flexible power transmission couplings are designed and selected to give an unlimited service if used within the parameters for which they are specified. Failures are rare and can generally be attributed to excessive misalignment, severe overload or a combination of both. In all cases of coupling failure, it is advisable that the cause of failure is first identified and corrected.

Failure of the coupling will generally be failure of a membrane assembly.

Transmission Unit Refurbishment

It is recommended that a transmission unit is the minimum spare ordered, in order to ensure that the quality of transmission unit assembly is maintained.

To replace the transmission unit, remove the hub bolts and then withdraw the transmission unit using the compression bolts feature in the spacer, as appropriate.

The transmission unit must be adequately supported during removal to avoid accidental damage should it slip.

ATTENTION When repairing John Crane flexible membrane couplings, only John Crane approved parts should be used.

NOTE: *For balanced TLK spacer couplings, the transmission unit is usually supplied as a factory assembled unit that should not be dismantled. However, when used at low or medium speeds, the transmission unit can be reconditioned but will require rebalancing.*

Guard ring assembly units (O-kits) should be replaced in pairs, failure of one will usually result in damage to the other.

TABLE 1

Coupling Size	Standard Hub Bolt Tightening Torque *		Extended Hub Bolt Tightening Torque *		Min Gap 'X'		Coupling Max Axial Deflection +/-		Dim'n 'A' (Nominal)		Dim'n 'A' (+/- Tol.)		Standard Hub Bolt Size
	Nm	Ft.lbf	Nm	Ft.lbf	mm	Inch	mm	Inch	mm	Inch	mm	Inch	
0300	35	26	120	88.5	9.1	0.358	1.4	0.055	10.20	0.402	0.10	0.004	M6
0500	65	48	120	88.5	9.4	0.370	1.7	0.067	11.05	0.435	0.15	0.006	M6
0750	120	88.5	180	133	10.1	0.398	1.9	0.075	11.75	0.463	0.15	0.006	M6
1050	120	88.5	180	133	10.7	0.421	2.2	0.087	12.50	0.492	0.20	0.008	M6
1500	180	133	280	206.5	11.9	0.469	2.4	0.094	14.00	0.551	0.20	0.008	M8
2000	280	206.5	280	206.5	13.4	0.528	2.7	0.106	15.60	0.614	0.20	0.008	M8
2600	280	206.5			14.6	0.575	3.0	0.118	16.95	0.667	0.25	0.010	M8
3350	180	133			15.3	0.602	3.2	0.126	17.95	0.707	0.25	0.010	M8
4250	180	133			16.1	0.634	3.5	0.138	18.90	0.744	0.30	0.012	M8
6010	280	206.5			17.3	0.681	3.9	0.154	20.40	0.803	0.30	0.012	M8
8500	280	206.5			19.8	0.780	4.4	0.173	23.35	0.919	0.35	0.014	M8
9013	280	206.5			23.1	0.909	5.0	0.197	27.10	1.067	0.40	0.016	M8
9017	280	206.5			25.2	0.992	5.5	0.217	29.60	1.165	0.40	0.016	M16
9021	280	206.5			28.1	1.106	6.0	0.236	32.90	1.295	0.50	0.020	M16
9036	280	206.5			34.3	1.350	7.1	0.280	39.95	1.573	0.55	0.022	M16
9049	280	206.5			37.7	1.484	7.9	0.311	44.05	1.734	0.65	0.026	M16

IMPORTANT:

Up to **100 N.m**, (74 Ft.lbf) fasteners are to be hand tigthend first then torqued to 100% of the required torque value.

From **100 - 250 N.m**, (74-184 Ft.lbf) fasteners are to be hand tightend first, then torqued in two stages of 50% and then 100% of the required value

For **above 250 N.m**, (184 Ft.lbf) fasteners are to be hand tightended first, then torqued in four stages of 25%, 50%, 75% and 100% of the required value.

A final circular sweep at 100% should be performed to ensue no fasteners have been missed and that all have an evenly distributed load.

NOTE: * *torque figures based on a light oil used for lubricant.*

Guard Ring Assembly Unit (O-kit) Replacement

1. Remove the drive bolts (8B) and nuts (8N), and remove the guard ring assembly from the spacer piece. Do not attempt to dismantle the guard ring assembly any further.
2. Identify the fasteners on the new guard ring assembly, which attach to the spacer flanges, and remove the loosely assembled nuts (8N).
3. With the bolts (8B) in position, carefully press on the bolt heads to push them into the spacer evenly.
   NOTE: *Light hammering with a soft mallet may be required, but ensure assembly is even so as not to over-strain the flexible membranes.*
4. Place a small amount of thread-locking compound (e.g. Loctite 242 or equivalent) on the protruding bolt threads and then assemble the nuts (8N). Holding the bolts firmly, turn the spacer nuts evenly to the correct tightening torque value given in Table 2.
5. Complete the refurbishment of the transmission unit by replacing the second guard ring assembly unit.

TABLE 2. Standard Tightening Torques

Coupling Size	Tightening Torque Nuts (8N)	
	Nm	Ft.lbf
0300	65	48
0500	105	78
0750	160	118
1050	225	166
1500	305	225
2000	425	313
2600	525	387
3350	525	387
4250	785	579
6010	1095	808
8500	1860	1372
9013	2400	1770
9017	3700	2729
9021	4450	3282
9036	7200	5310
9049	10700	7892

FIGURE 6

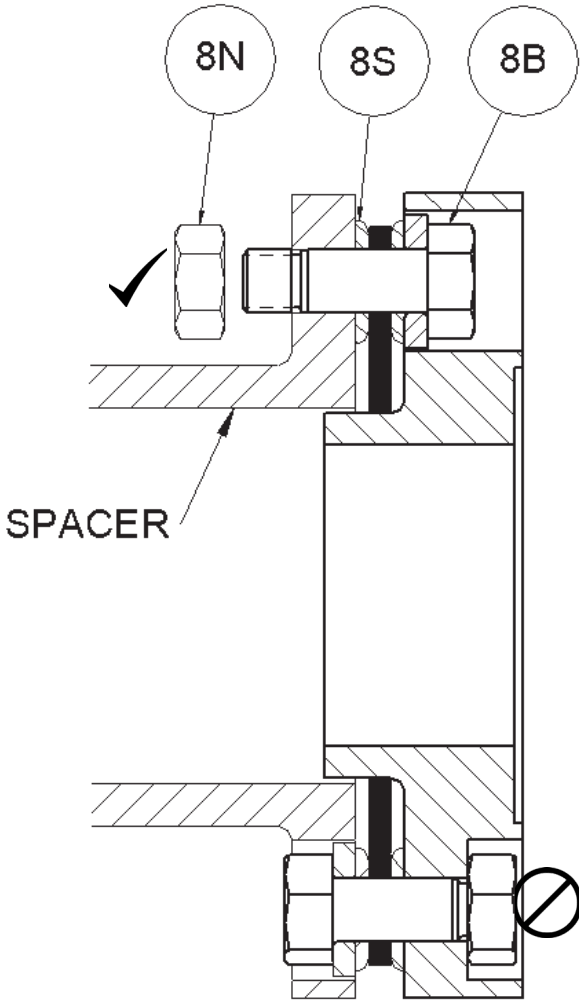


Image indicative of TLKS Coupling

ATEX / IECEx

EU/UK DECLARTION OF CONFORMITY

The respect of the Essential Health and Safety Requirements is ensured by conformity with:
EN ISO 80079-36 : 2016 / BS EN IEC 80079-36 : 2016 / EN ISO 80079-37 : 2016 / BS EN IEC 80079-37 : 2016

CE / ATEX Marking

All couplings that comply with CE, ATEX and UKEX legislation. In addition, T, L and H series couplings supplied by France also comply with IECEx legislation. Couplings will be marked as shown. This will be etched on the spacer element of the transmission unit if enough room is available. Marking has to be readable and indelible; it has to include the following indications:

- CE Stamp
- Manufacturing postcode and country
  (Full site address for IECEx marking, where is applicable.)
- Coupling part number
- INERIS Certificate Reference for ATEX,
  INERIS Certificate reference for IECEx, where is applicable.
- (Serial number)
- (Year of construction)
- II 2 GD or I M1
- Ex h IIC T(*) Gb (For ATEX only)
- Ex h IIIC T(*) Db (For ATEX only)
- Ex h IIC T6...T3(*) Gb (For IECEx only)
- Ex h IIIC T85°C...T200°C(*) Db (For IECEx only)
- Ex h I T150°C
- Tamb: (*)

EXAMPLES

CE Ex II 2 GD Ex h IIC T3 Gb – Ex h IIIC T200°C Db 76250, France.
TSKS/0055/KA/GA-YYYYY or TSKS/0055/KK/YYYY, xxxxx
INERIS 20ATEX3006, Tamb 150°C, 20ZZ

IECEx marking (T, L and H series couplings supplied by John Crane France.):

Ex h I T150°C Mb

John Crane FR-76250 Deville lés Rouen.
TSKS/0120/KA/GA-YYYYY or TSKS/0120/KK/YYYY, xxxxx
IECEx INE 24.0004X, 20ZZ

Note: The xxxxx is a product specific serial number. 'ZZ' is the year of manufacture and will change. For example, for year 2020; ZZ = 20.

(*) : see Table A1 below.

Note: IECEx marking is only applicable for T, L and H series couplings supplied by John Crane France.

TABLE A1. Temperature Classes Based On Ambient Temperature Range

Ambient Temperature Range		Temperature Class		
Min.*	Max.	Gas	Dust	Mining
-15°C <	Ta < 150°C	T3	T200°C	N/A
-15°C <	Ta < 90°C	T4	T135°C	150°C
-15°C <	Ta < 55°C	T5	T100°C	150°C
-15°C <	Ta < 40°C	T6	T85°C	150°C

ATTENTION

For maximum ambient temperature above 90°C, use in mining is not authorized.
Marking may be carried out in the language of the country of use.
The protective system or equipment must additionally carry the marking normally stipulated by its construction standards.

John Crane can supply a Low tempreature coupling option which can reach a minimum opterating tempreature of -55°C. For these couplings, this value would supersede the - 15°C quoted in table A1. Maximum operating tempreature (and therefore T-Class) would be unaffected.

Operation in aggressive atmospheres

The following components contain non-metallic materials. Confirm compatibility or provide suitable protection if the coupling is to operate in an aggressive atmosphere.

- The hub electrical insulation (if supplied option) – reinforced thermosetting plastic
- Limited end float bearings (if supplied option) – PTFE based plastic
- Elastomeric inserts for the A-Series coupling types

Temperature classification of John Crane's Metastream couplings

John Crane's Metastream metal membrane couplings, supplied in conformance with Directive 2014/34/EU & legislation SI 2016 No. 1107, have to meet the classifications specified in Table A1 when used in accordance with instructions and information supplied.

A series couplings, using the elastomeric type flexible elements, are covered by type examination certificates:

ATEX - INERIS 20ATEX3019

T, L and H series couplings, using the disk type flexible elements, are covered by type examination certificates:

ATEX - INERIS 20ATEX3006 / IECEx - INE 24.0004X

M series couplings, using the diaphragm type flexible elements, are covered by type examination certificates:

ATEX - INERIS 20ATEX3018

Note: IECEx certificates are available on the IECEx official website:

https://www.iecex-certs.com/#/home

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EU/UK Declaration of Conformity

EEC Directive 2014/34/EU of 26.02.2014
&
UK Statutory Requirements SI 2016 No. 1107
and resultant legislation and standards

We, the manufacturers – John Crane UK Ltd, – confirm that the explosion prevention requirements have been implemented for

Metastream® metal-membrane couplings
and Powerstream elastomeric couplings

Equipment complies with the requirements of directive 2014/34/EU. It is in accordance with article 1 3. (a) of the directive and the fundamental Health and Safety requirements of Annex II, are fulfilled.
Equipment also complies with the requirements of UK Statutory requirement SI 2016 No. 1107.

The current Type Examination Certificates for the couplings are:-

'T', 'L' & 'H' Series	-	ATEX - INERIS 20ATEX3006
'M' Series	-	ATEX - INERIS 20ATEX3018
'A' Series	-	ATEX - INERIS 20ATEX3019

The technical documentation is deposited with the designated approved bodies in accordance with the relevant standards.

ATEX - Ineris, AV du Parc Alata, Verneuil-en-Halatte 60550, **France**

Signed: Date: 1st April 2021

S. Pennington (Senior Manager - Engineering Couplings)

Declaration of Incorporation

EEC MACHINERY DIRECTIVE 2006/42/EC & UK SI 2008:1597

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Declaration of Incorporation

E.C. Machinery Directive (2006/42/EC) & UK Statutory Requirements SI 2008 No. 1597

Section 1.0 - Machinery Description:
Flexible Power Transmission Ring and Diaphragm Form Membrane & Elastomeric Couplings Types:

'H', 'T', 'L', 'M' & 'A' Series

Section 2.0 - Applicable Harmonised Standards (where stated)
ISO13709 (API 610) for centrifugal pumps
ISO14691 couplings for - General-purpose applications
ISO10441 (API 671) couplings for - Special-purpose applications

Section 3.0 - Declaration:
We, John Crane declare that under our sole responsibility for the supply of the machinery defined in Section 1.0 above, the said machinery parts are intended to be incorporated into other machinery or assembled with other machinery to constitute machinery as covered by this Directive.

The machinery parts, covered by this declaration must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the Directive.

Signed: Date: 1st January 2024

S. Pennington
(Senior Manager - Engineering Couplings)