FLENDER BIPEX® couplings

Types BWN, BWT and BNT

Operating instructions
BA 3400 EN 01/2012

FLENDER couplings

SIEMENS

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Operating instructions

Translation of the original operating instructions

Notes and symbols in these operating instructions

Note: The term "operating instructions" will in the following also be shortened to "instructions" or "manual".

Legal notes

Warning-note concept

This manual comprises notes which must be observed for your personal safety and for preventing material damage. Notes for your personal safety are marked with a warning triangle or an "Ex" symbol (when applying Directive 94/9/EC), those only for preventing material damage with a "STOP" sign.

WARNING! Imminent **explosion!**

The notes indicated by this symbol are given to prevent **explosion damage.**
Disregarding these notes may result in serious injury or death.

WARNING! Imminent **personal injury!**

The notes indicated by this symbol are given to prevent **personal injury.**
Disregarding these notes may result in serious injury or death.

WARNING! Imminent **damage to the product!**

The notes indicated by this symbol are given to prevent **damage to the product.**
Disregarding these notes may result in material damage.

NOTE!

The notes indicated by this symbol must be treated as general **operating information**.
Disregarding these notes may result in undesirable results or conditions.

WARNING! Hot surfaces!

The notes indicated by this symbol are made to prevent **risk of burns due to hot surfaces** and must always be observed.
Disregarding these notes may result in light or serious injury.

Where there is more than one hazard, the warning note for whichever hazard is the most serious is always used. If in a warning note a warning triangle is used to warn of possible personal injury, a warning of material damage may be added to the same warning note.

Qualified personnel

The product or system to which these instructions relate may be handled only by persons qualified for the work concerned and in accordance with the instructions relating to the work concerned, particularly the safety and warning notes contained in those instructions. Qualified personnel must be specially trained and have the experience necessary to recognise risks associated with these products or systems and to avoid possible hazards.

Intended use of Siemens products

Observe also the following:

Siemens products must be used only for the applications provided for in the catalogue and the relevant technical documentation. If products and components of other makes are used, they must be recommended or approved by Siemens. The faultfree, safe operation of the products calls for proper transport, proper storage, erection, assembly, installation, start-up, operation and maintenance. The permissible ambient conditions must be adhered to. Notes in the relevant documentations must be observed.

Trademarks

All designations indicated with the registered industrial property mark ® are registered trademarks of Siemens AG. Other designations used in these instructions may be trademarks the use of which by third parties for their own purposes may infringe holders' rights.

Exclusion of liability

We have checked the content of the instructions for compliance with the hard- and software described. Nevertheless, variances may occur, and so we can offer no warranty for complete agreement. The information given in these instructions is regularly checked, and any necessary corrections are included in subsequent editions.

Note on the EC Machinery Directive 2006/42/EC

Siemens couplings in the "FLENDER couplings" product range must be treated as "components" in the sense of the EC Machinery Directive 2006/42/EC.
Therefore, Siemens needs not issue a declaration of incorporation.
Information on safe fitting, safe startup and safe operation can be found in this instructions manual; in addition the "warning-note concept" therein must be observed.

Contents

1. Technical data

The instructions describe the coupling in horizontal mounting position with shaft-hub connection by cylindrical or conical bores with parallel key or with TAPER clamping bush. If a vertical or inclined arrangement or other shaft-hub connections, such as shrink fit or splines to DIN 5480, are to be used, Siemens must be consulted.

If a dimensioned drawing has been made out for the coupling, the data in this drawing must be given priority. The dimensioned drawing including any other documents should be made available to the user of the system.

For part numbers and part designations, see the corresponding spare-parts drawing in section 7 or the dimensioned drawing.

1.1 Torques, speeds, geometric data and weights

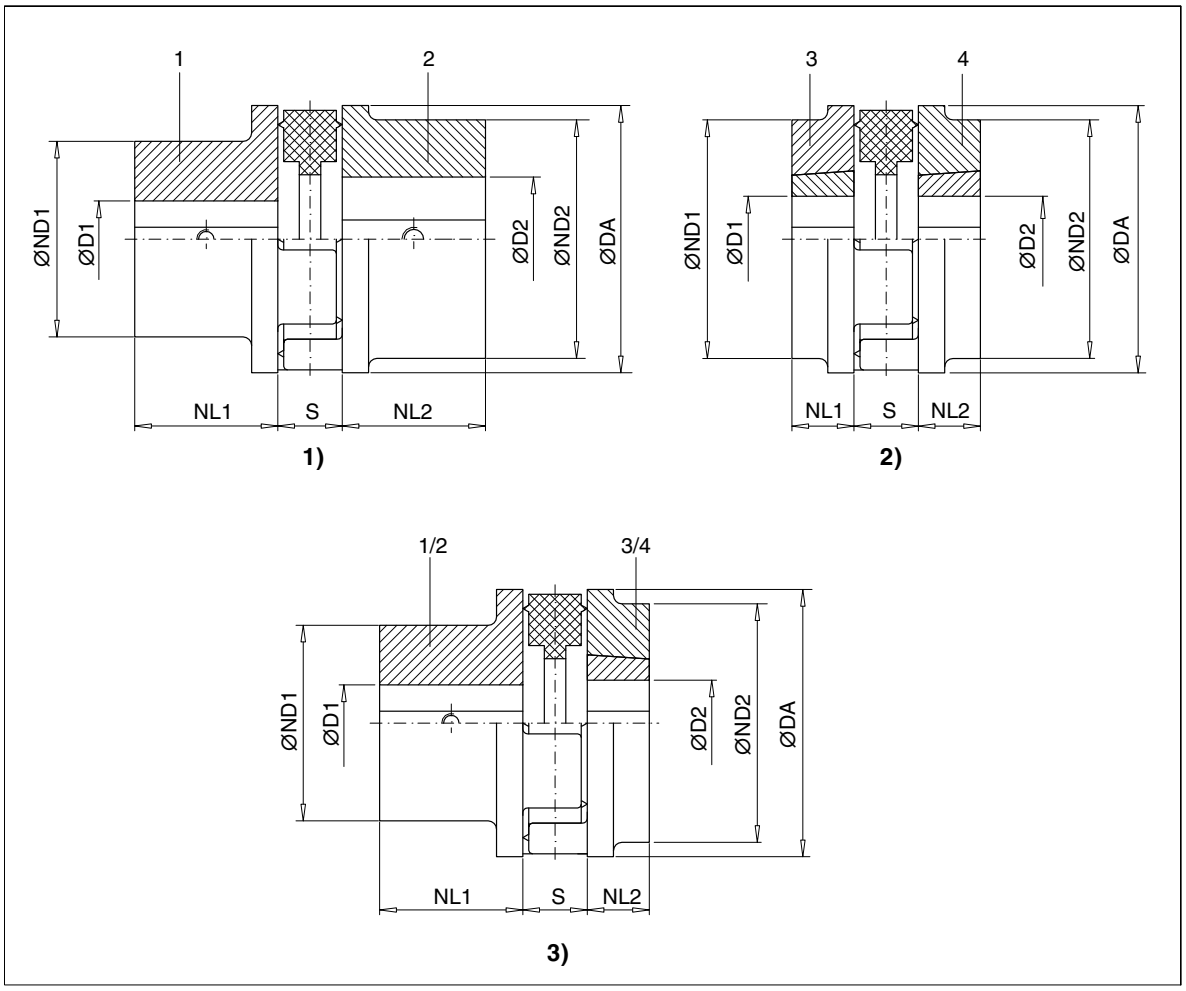

Fig. 1: Types BWN, BWT and BNT

1) Type BWN

2) Type BWT

3) Type BNT

For versions of the types, see section 7.

Table 1: Speeds, geometric data and weights

Size	Rated torque	Speed n_{max}		D1 / D2 Part			DA	ND1 / ND2 Part		NL1 / NL2 Part		D3	S		TAPER clamping bush	Weight Type		
	T_{KN}	Cam ring		1/2	3/4			1/2	3/4	1/2	3/4			deviation		BWN	BWT	BNT
		92 Shore	80 Shore	max. 1)	min.	max. 1)+2)										3)	3)	3)
	Nm	1/min		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	No.	kg	kg	kg
43	13.5	5000	5000	25			43	43		22		21	12	+0.5		0.36		
53	24	5000	5000	30			53	50		25		25	14	+0.5		0.62		
62	42	5000	5000	35	10	25	62	58	58	30	23	29	16	+0.5	1008	0.96	0.75	0.9
72	75	5000	4800	32 42	10	28	72	54 68	68	35	23	36	18	+0.5	1108	1.4 1.6	1.2	1.3 1.4
84	130	5000	4100	38 48	11	32	84	64 76	76	40	26	40	21	+0.5	1210	2.1 2.3	1.5	1.8 1.9
97	220	5000	3500	42 50			97	72 85		50		48	24	+1		3.3 3.6		
112	360	5000	3100	48 60	14	42	112	82 100	100	60	26	54	27	+1	1610	5.0 5.8	3.2	4.1 4.5
127	550	5000	2700	55 65			127	94 110		65		61	27	+1		7.3 7.8		
142	800	4900	2500	60 75	18	50	142	100 126	126	75	33	70	31	+1	2012	9.8 11.5	6.2	8 8.9
162	1250	4200	2100	65 80			162	110 134		80		81	36	+1		13.5 15.5		
182	1750	3800	1900	75 90	18	60	182	126 152	152	90	45	90	42	+1	2517	19.5 22	11.3	15.5 16.7
202	2650	3400	1700	80 100	35	75	202	134 168	168	100	52	100	48	+1	3020	25 30	15.6	20 23
227	3700	3000	1500	90 110	42	90	227	150 180	180	110	90	111	54	+2	3535	40 45	30.0	35 37.5

1) Maximum bore with keyway to DIN 6885/1.

2) Somes bores are machined with a shallow keyway, see fig. 2 and table 2.

3) Weights are valid for maximum bores.

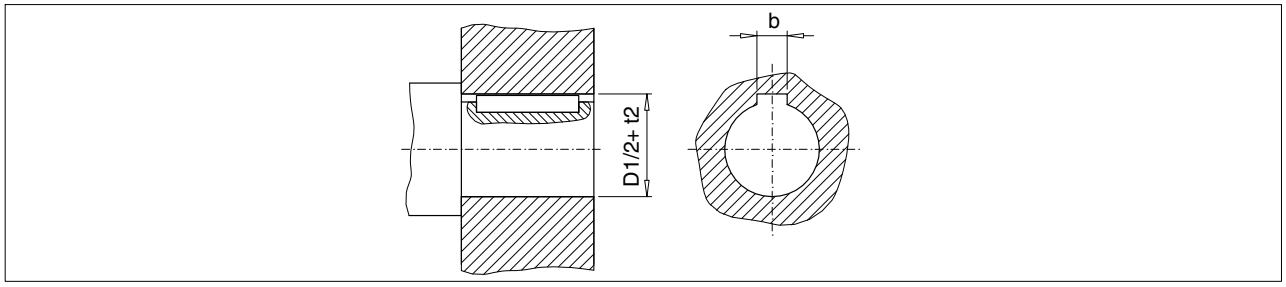

Fig. 2: Shallow keyway in TAPER clamping bushes

Table 2: Shallow keyway in TAPER clamping bushes

TAPER clamping bush **Nr.**	Hole **D1/2** mm	Width **b** JS9 mm	Hub keyway depth **D1/2 + t2** mm	TAPER clamping bush **Nr.**	Hole **D1/2** mm	Width **b** JS9 mm	Hub keyway depth **D1/2 + t2** mm
1008	24	8	D1/2 + 2	1108	28	8	D1/2 + 2
1008	25	8	D1/2 + 1.3	1610	42	12	D1/2 + 2.2

1.2 Cam rings (50)

- Cam rings may be stored for up to 5 years.
- Cam rings must be protected against direct sunlight, artificial light with a high ultraviolet content and extreme temperatures.
- Cam rings must not come into contact with aggressive media.
- Cam rings must not be heated up to impermissible temperatures during fitting work (see table 3).

Table 3: BIPEX cam ring

Material	Hardness	Remark	Mark	Temperature range
PU	92 Shore A	Standard	black	- 30 °C to + 80 °C

2. Notes

2.1 Safety instructions and general notes

⚠ **All persons involved in the installation, operation, maintenance and repair of the coupling or clutch must have read and understood these instructions and must comply with them at all times. Disregarding these instructions may cause damage to the product and material and/or injury to persons. Damage caused by disregard of these instructions will result in exclusion of liability.**

During transport, installation, dismantling, operation and maintenance of the unit, the relevant safety and environmental regulations must be complied with at all times.

⚠ **Lifting gears and load equipment for handling the components must be suitable for the weight of the coupling.**

Depending on national regulations, coupling and clutch components may have to be disposed of separately or separated for recycling.

The coupling must be stored in a dry environment. Adequate preservation must be carried out.

Operators and users must not make any changes to the coupling themselves over and above the treatment specified in these instructions.

⚠ **If there is any visible damage the coupling must not be fitted or put into operation!**

The coupling must not be operated unless housed in a suitable enclosure in accordance with the standards applying. This also applies to test runs and when checking the direction of rotation.

All work on the coupling must be carried out only when it is at a standstill. Secure the drive unit to prevent unintentional switch-on! A notice should be attached to the ON switch stating clearly that work is in progress.

In addition to any generally prescribed personal safety equipment (such as safety shoes, safety clothing, helmet) **suitable safety gloves** and **suitable safety glasses** must be worn when handling the coupling!

Only spare parts made by the manufacturer Siemens must be used.

Any enquiries should be addressed to:

Siemens AG
Schlavenhorst 100
46395 Bocholt

Tel.: +49 (0)2871 / 92-0
Fax: +49 (0)2871 / 92-2596

3. Fitting

The coupling parts 3 and 4 are delivered with bore for TAPER clamping bush.

3.1 Machining the finished bore in coupling part (1/2)

Remove the cam ring (50).

Depreserve and clean coupling parts (1/2).

Clamp on surfaces marked with ⌜ , and align.

Greater caution is necessary owing to the rotating cams.

Machine the finished bore, observe maximum bore described in section 1.

Check finished bore as described in section 3.

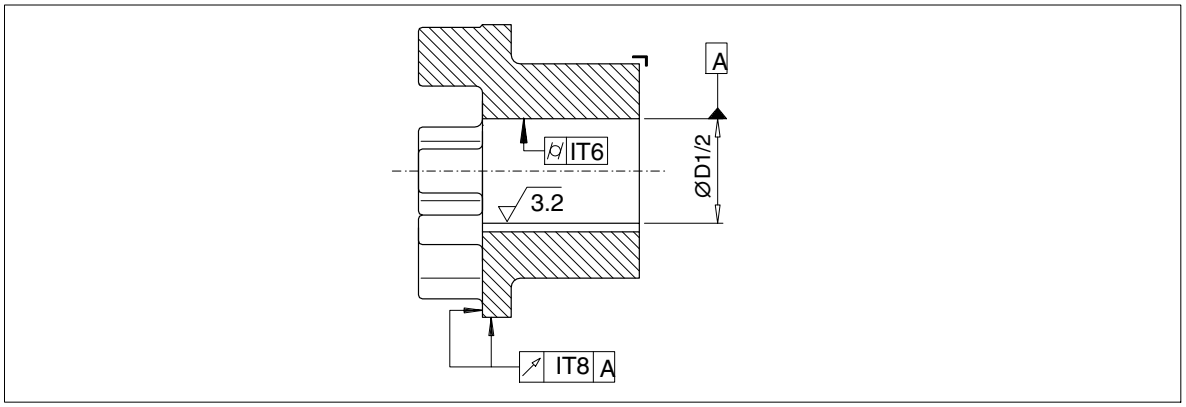

Fig. 3: Machining the finished bore in coupling part (1/2)

Table 4: Fit recommendation for bores with parallel-key connection

Description	Push fit		Press fit		Interference fit		
	not suitable for reversing operation				suitable for reversing operation		
Shaft tolerance	j6	h6	h6	k6	m6	n6	h6
Bore tolerance	H7	J7	K7	H7	H7	H7	M7

The fit assignment m6 / H7 is particularly suitable for many applications.

Failure to observe these instructions may result in breakage of the coupling. Danger from flying fragments!

3.2 Machining the parallel keyway in coupling part (1/2)

- Parallel keyway to DIN 6885/1 ISO JS9 with usual operating conditions.
- Width of parallel keyway ISO P9 with reversing operation.

3.3 Axial fastening of the coupling parts (1/2)

Up to size 84 arrange the set screw displaced by 180° relative to the keyway. As from size 97 arrange the set screw on the parallel keyway.

Position of the set screw approximately in the middle of the hub.

Use threaded studs to DIN 916 with cup points as set screws (set-screw size to table 5).

The set screw should fill out the screw thread as much as possible and must not project beyond the hub.

Alternatively use end plate; as regards recess contact Siemens.

Table 5: Set-screw assignment and tightening torques

Coupling parts 1 / 2 of the types BWN and BNT				
Bore range		Set-screw size	Tightening torque	Wrench width
over	up to	d_1	T_A	Hexagon socket wrench
mm	mm	mm	Nm	mm
6	30	M 6	4	3
30	38	M 8	8	4
38	65	M 10	15	5
65	95	M 12	25	6
95	110	M 16	70	8

Tightening torques apply to bolts with untreated surfaces which are not or only lightly oiled (coefficient of friction $\mu = 0.14$). The use of lubricant paint or lubricant, which affects the coefficient of friction "μ", is not permitted.

The specified tightening torques T_A must be complied with, applying DIN 25202 Screw-Connection Class "C", with an output-torque scatter of ± 5 %.

3.4 Balancing after machining the finished bore

The balancing quality is to be specified in accordance with the specific application (however at least G16 to DIN ISO 1940).

Balancing prescription to DIN ISO 8821 of the shaft must be observed.

Balancing bores must not affect the load-bearing capacity of the coupling parts.

The balancing bores must be applied on a large radius with sufficient distance to the cams and the outer circumference.

STOP **Removing of material must be done between the cams, however the bottom must not be completely drilled through.**

3.5 Fitting the coupling parts (1/2)

Unscrew the set screw.

Clean the holes and shaft ends.

Coat the bores of the coupling parts (1/2) and the shafts with MoS_2 mounting paste (e.g. Microgleit LP 405).

STOP **Coupling parts (1/2) with tapered bore and parallel-key connection must be fitted in cold condition and secured with suitable end plates, without drawing the coupling parts (1/2) further onto the taper (fitting dimension = 0).**

Place the coupling parts (1/2), in case of cylindrical bore heat up to max. + 150 °C, if necessary. When heating up observe the temperature range of the cam ring (50) (see table 3), if necessary demount the cam ring (50).

Axial securing is effected by means of the set screw or end plate. When securing by set screw the shaft must not project or be set back from the inner sides of the hub.

Fit the set screw or end plate (tightening torques of the set screw to table 5).

Failure to observe these instructions may result in breakage of the coupling. Danger from flying fragments!

If necessary re-fit the cam ring. Observe the temperature range (see table 3).

Align the coupling as described in item 3.7.

3.6 Fitting the coupling parts 3 and 4

Clean the TAPER clamping bushes, holes and shaft ends.

Up to size 3030 = 2 and from size 3535 = 3 up the TAPER clamping bushes have axially parallel, cylindrical and smooth blind holes in the large end face, only half of which are in the material of the bush. The other half, which is in the hub, have threads.

Insert coupling parts (3; 4) and TAPER clamping bush one inside the other, align holes and slightly tighten the bolts of the clamping bush.

Place the coupling part (3; 4) with the TAPER clamping bush on the shaft. Note instructions in item 3.8.

Tighten the clamping-bush screws one after the other (for tightening torques see item 3.10).

During the screwing-on operation the hub is drawn onto the TAPER clamping bush and the bush thus pressed onto the shaft.

Fill the unused holes in the TAPER clamping bushes with grease to prevent the penetration of dirt.

Align the coupling as described in item 3.7.

☞ The shaft misalignment should be kept as low as possible in order to minimize wear and restorative forces.

3.7 Possible misalignments

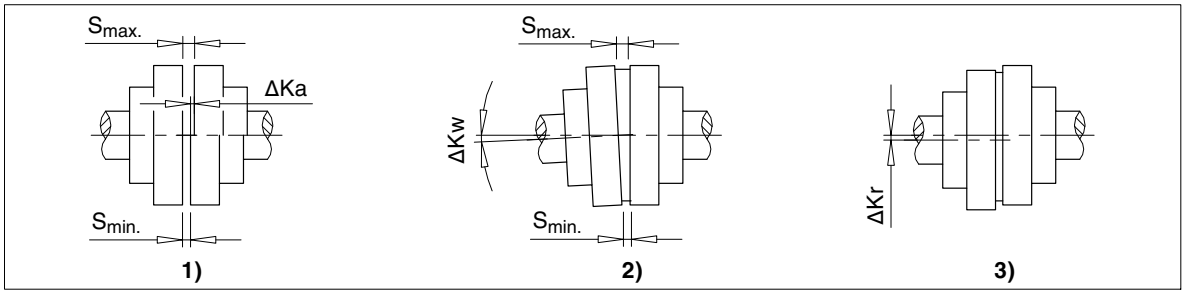

Fig. 4: Possible misalignments

1) Axial misalignment (ΔKa) 2) Angular misalignment (ΔKw) 3) Radial misalignment (ΔKr)

3.7.1 Axial misalignment

The gap dimension ΔKa should be set within the deviation permitted for the dimension "S" (see section 1).

3.7.2 Angular misalignment

The angular misalignment ΔKw can be measured as difference of the gap dimension ($\Delta S = S_{max.} - S_{min.}$) $\Delta S_{perm.}$, see table 6.

If required, the permissible angular misalignment ΔKw can be calculated as follows:

$\Delta Kw_{perm.}$ in RAD = $\Delta S_{perm.}$ / DA $\Delta S_{perm.}$, see table 6.

$\Delta Kw_{perm.}$ in GRAD = ($\Delta S_{perm.}$ / DA) x (180 / π) "DA" in mm, see section 1.

3.7.3 Radial misalignment

The permissible radial misalignment $\Delta Kr_{perm.}$ can be found in table 6 (depending on the operating speed).

3.8 Alignment

☞ When aligning, the angular and radial misalignment should be kept as low as possible.

Misalignment values specified in table 6 are maximum permissible overall values in operation, resulting from mispositioning through imprecision during alignment and misalignment through operation (e.g. deformation through load, heat expansion).

Reduced misalignment in the coupling minimises expected wear on the cam ring. Misalignment in the coupling gives rise to restorative forces which may impose inadmissible stress on adjacent machine parts (e.g. bearings).

3.9 Shaft-misalignment values during operation

☞ The following maximum permissible misalignments must by no means be exceeded during operation.
When aligning the angular and radial misalignment should be kept appreciably smaller (tending towards zero).

Table 6: Shaft-misalignment values $\Delta S_{perm.}$ and $\Delta Kr_{perm.}$, maximum permissible during operation, stated in mm (rounded)

Size	Coupling speed in 1/min			
	1000	1500	2000	3000
43	0.08	0.06	0.05	0.04
53	0.09	0.07	0.06	0.05
62	0.11	0.08	0.07	0.06
72	0.12	0.09	0.08	0.06
84	0.14	0.11	0.09	0.07
97	0.16	0.13	0.11	0.09
112	0.19	0.15	0.13	0.10
127	0.21	0.17	0.15	0.12
142	0.24	0.19	0.16	0.13
162	0.27	0.22	0.18	0.15
182	0.30	0.24	0.21	0.17
202	0.34	0.27	0.24	0.19
227	0.38	0.30	0.26	0.21

For speeds < 1000 1/min the values in the colon "1000 1/min" in table 6 apply.

3.10 Assignment of the tightening torques and wrench widths of the screw fastening of the TAPER clamping bushes

The use of an impact screwdriver is not permissible!

Tightening torques apply to bolts with untreated surfaces which are not or only lightly oiled (coefficient of friction $\mu = 0.14$). The use of lubricant paint or lubricant, which affects the coefficient of friction "μ", is not permitted.

The specified tightening torques T_A must be complied with, applying DIN 25202 Screw-Connection Class "C", with an output-torque scatter of ± 5 %.

The tightening torques and wrench widths of the set screws are specified in table 5.

Table 7: Tightening torques and wrench widths of the screw fastening of the TAPER clamping bushes

Size	TAPER clamping bush No.	Tightening torque T_A and wrench width SW for fastening screws to DIN 911			
		BSW Inch	**Length** Inch	**T_A** Nm	**SW** mm
62	1008	1/4	1/2	5.6	3
72	1108	1/4	1/2	5.6	3
84	1210	3/8	5/8	20.0	5
112	1610	3/8	5/8	20.0	5
142	2012	7/16	7/8	31.0	5
182	2517	1/2	1	48.0	6
202	3020	5/8	1 1/4	90.0	8
227	3535	1/2	1 1/2	113.0	10

4. Start-up and operation

Bolt-tightening torques for the coupling and tightening torques for the foundation bolts of the coupled machine must be checked before start-up. Enclosures (coupling protection, contact guard) must be fitted!
Overload conditions during start-up cannot be excluded. If the coupling breaks through overload, metal parts may fly off and cause personal injury and/or material damage.

The coupling must run with little noise and without vibration. Irregular behaviour must be treated as a fault requiring immediate remedy. In case of fault the drive must be stopped at once. The necessary measures for repair must be taken in accordance with the safety regulations applying.

5. Faults, causes and remedy

5.1 Possible cause of fault

Change in alignment:
- Rectify the cause of the change in alignment (e.g. loose foundation bolts).
- Align the coupling.
- Check the axial fastening and, if necessary, adjust.
- Wear check of the cam ring (50) as described in section 6.

Cam ring (50) worn:
- Wear check of the cam ring (50) as described in section 6, if necessary replace the cam ring (50).

5.2 Incorrect use

Failure to observe these instructions may result in breakage of the coupling. Danger from flying fragments!

5.2.1 Frequent faults when selecting the coupling and/or coupling size

- Important information for describing the drive and the environment are not communicated.
- System torque too high.
- System speed too high.
- Application factor not correctly selected.
- Chemically aggressive environment not taken into consideration.
- The ambient temperature is not permissible.
- Finished bore with inadmissible diameter and/or inadmissible assigned fits.
- Machining of parallel keyways of which the width across corners is greater than the width across corners of the parallel keyways to DIN 6885/1 with a maximum permissible bore.
- The transmission capacity of the shaft-hub connection is not appropriate to the operating conditions.
- Maximum load or overload conditions are not being taken into consideration.
- Dynamic load conditions are not being taken into consideration.
- Shaft-hub connection resulting in impermissible material stress on the coupling.
- Operating conditions are being changed without authorisation.
- Coupling and machine / drive train form a critical torsional, axial and bending vibration system.
- Fatigue torque load too high.

5.2.2 Frequent faults when fitting the coupling

- Components with transport or other damage are being fitted.
- When fitting coupling parts in a heated condition, cam rings are being excessively heated.
- The shaft diameter is beyond the specified tolerance range.
- Coupling parts are being interchanged, i.e. their assignment to the specified shaft is incorrect.
- Specified axial fastenings are not fitted.
- Specified tightening torques are not being adhered to.
- Bolts are inserted dry or greased.
- Flange surfaces of screwed connections have not been cleaned.
- Alignment and/or shaft-misalignment values do not match the specifications in the instructions manual.
- The coupled machines are not correctly fastened to the foundation, and as a result shifting of the machines e.g. through loosening of the foundation-screw connection is causing excessive displacement of the coupling parts.
- The coupled machines are not sufficiently earthed.
- Cam ring is not fitted.
- The coupling guard used is not suitable.

5.2.3 Frequent faults in maintenance

- Maintenance intervals are not being adhered to.
- No genuine BIPEX spare parts are being used.
- Old or damaged BIPEX spare parts are being used.
- Leakage in the vicinity of the coupling is not being identified and as a result chemically aggressive media are damaging the coupling.
- Fault indications (noise, vibrations, etc.) are not being observed.
- Specified tightening torques are not being adhered to.
- Alignment and/or shaft-misalignment values do not match the specifications in the instructions manual.

6. Maintenance and repair

6.1 Maintenance interval

The torsional backlash between the two coupling parts must be checked after three months, then at least once a year.

The cam ring must be replaced, when the torsional backlash exceeds the value stated in table 8.

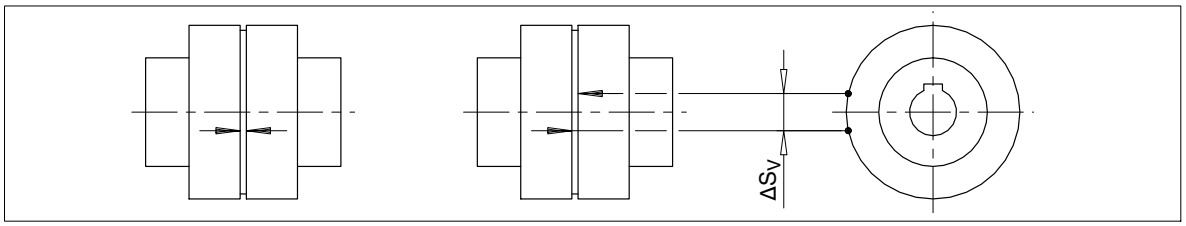

Fig. 5: Wear mark

Table 8: Wear mark for the torsional backlash

Size	**43**	**53**	**62**	**72**	**84**	**97**	**112**	**127**	**142**	**162**	**182**	**202**	**227**
Wear mark S_V (mm)	2	2	2.5	3	3.5	4	4.5	5	5.5	6.5	7.5	8	9

Failure to observe these instructions may result in breakage of the coupling. Danger from flying fragments!

6.2 Replacement of wearing parts

The cam ring cannot be replaced without shifting the coupled machines.

For re-assembly, the instructions in sections 3 and 4 must be observed.

6.3 Demounting the coupling parts (1/2)

Move the coupled machines apart.

Remove the axial fastening (set screw, end plate). Mount a suitable detaching device. Using a burner, heat coupling part (1/2) along its length and above the parallel keyway (max. + 80 °C). When heating up observe the temperature range of the cam ring (50) (see table 3), if necessary demount the cam ring (50).

Pull the coupling part (1/2) off. Examine the hub bore and the shaft for damage, and protect against rust. Damaged parts must be replaced.

For re-assembly, the instructions in sections 3 and 4 must be observed.

6.4 Demounting the coupling parts 3 and 4

Move the coupled machines apart.

The TAPER clamping bushes are released by removing the bolts. One of the bolts is then screwed into the bush thread as a forcing-off screw and tightened.

From TAPER clamping bush no. 3535 up, two forcing-off screws are provided.

The coupling part thus released can be pulled off by hand with the TAPER clamping bush without tools. Examine the coupling parts 3 and 4, the TAPER clamping bush and the shaft for damage and protect against rust. Damaged parts must be replaced.

For re-assembly, the instructions in sections 3 and 4 must be observed.

7. Stocking spare parts

7.1 Spare parts

For ordering spare parts state the following data, as far as possible:

- Siemens order number and position
- Drawing number
- Coupling type and coupling size
- Part numer (see spare-parts list)
- Bore, bore tolerance, keyway and balancing as well as particular characteristics such as flange-connection dimensions, intermediate-shaft length, brake-drum dimensions.
- Any special details such as temperature, electrically insulating.

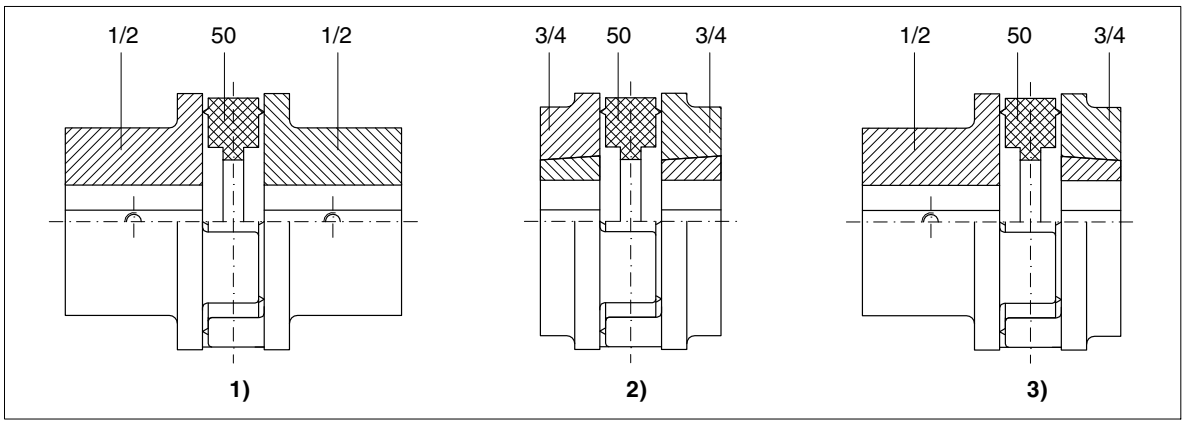

Fig. 6: Spare-parts drawing

1) Type BWN

2) Type BWT, versions see table 10.

3) Type BNT, versions see table 11.

The TAPER clamping bush is in the case of part 3 fitted from the shaft-end face side, in the case of part 4 from the shaft-shoulder side.

Table 9: Spare-parts list, type BWN

BWN	
Part number	Designation
1	Coupling part 1/2
2	Coupling part 1/2
50	Cam ring

Table 10: Spare-parts list, type BWT

BWT version A		**BWT version B**		**BWT version AB**	
Part number	Designation	Part number	Designation	Part number	Designation
3	Coupling part 3	4	Coupling part 4	3	Coupling part 3
3	Coupling part 3	4	Coupling part 4	4	Coupling part 4
50	Cam ring	50	Cam ring	50	Cam ring
100	TAPER bush	100	TAPER bush	100	TAPER bush
100	TAPER bush	100	TAPER bush	100	TAPER bush

Table 11: Spare-parts list, type BNT

BNT version A		**BNT version Bö**	
Part number	Designation	Part number	Designation
1	Coupling part 1/2	1ö	Coupling part 1/2
3	Coupling part 3	4	Coupling part 4
50	Cam ring	50	Cam ring
100	TAPER bush	100	TAPER bush

Further Information:

"FLENDER gear units" on the Internet
www.siemens.com/gearunits

"FLENDER couplings" on the Internet
www.siemens.com/couplings

Service & Support:
http://support.automation.siemens.com/WW/view/en/10803928/133300

Lubricants:
http://support.automation.siemens.com/WW/view/en/42961591/133000

Siemens AG
Industry Sector
Mechanical Drives
Alfred-Flender-Straße 77
46395 Bocholt
GERMANY

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