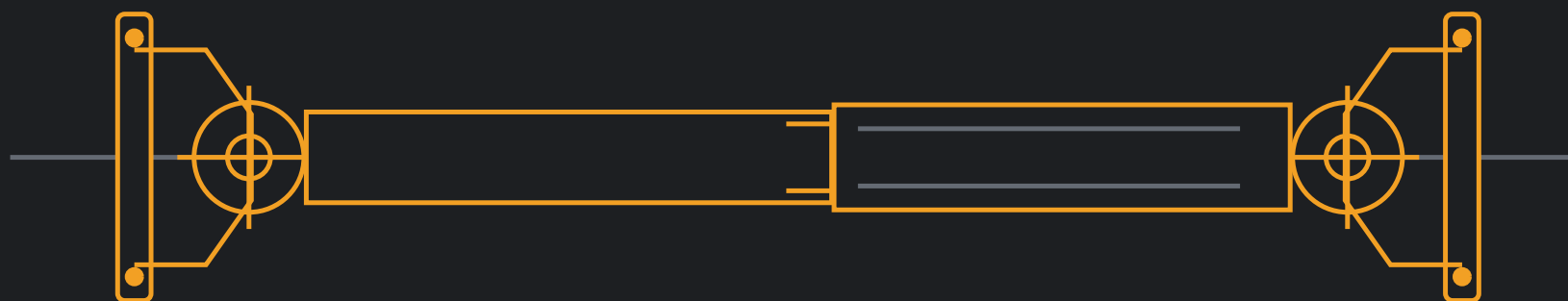


Industrial cardan shafts

Technical selection catalogue



Configurations, reference dimensions and drive requirements. From the existing assembly to an agreed industrial shaft specification.

S / M / L / XL / XXL / XXL+

Inside the catalogue

Reference series and dimensions from WiCHMANN Industry Catalogue 2023. They describe the source range, not certified ALWAZEN ratings or confirmed stock. Final selection, supply and acceptance are agreed for each project.

01	Applications & configurations	03-06
02	Dimensions & reference series	07-14
03	Flange interfaces & connections	15-20
04	Engineering selection	21-27
05	Service & project brief	28-33

Designed around the drive

The duty cycle matters as much as nominal torque. Specify the equipment, load history and environment before selecting the assembly.

01

Steel & rolling mills

Main and auxiliary drives, reversing duty, roll changes and high shock loads.

02

Paper & printing

Continuous running, vibration control, alignment and bearing-life requirements.

03

Pumps & process machinery

Speed, service life, installation geometry and ambient conditions.

04

Rail & heavy equipment

Changing geometry, dynamic loads and defined acceptance requirements.

05

Cranes & handling

Intermittent cycles, starts, braking and reversing operation.

06

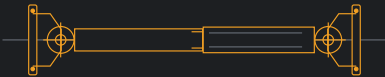
Test stands & machines

Defined torque/speed envelope, mounting space and measurement requirements.

Seven reference configurations

Design numbers below identify the original reference configurations. They are not ALWAZEN part numbers.

100



Length compensation

105



Double-flange with length compensation

110



Short coupling shaft

130



Fixed-length tube shaft

135



Fixed-length double-flange shaft

160



Intermediate shaft

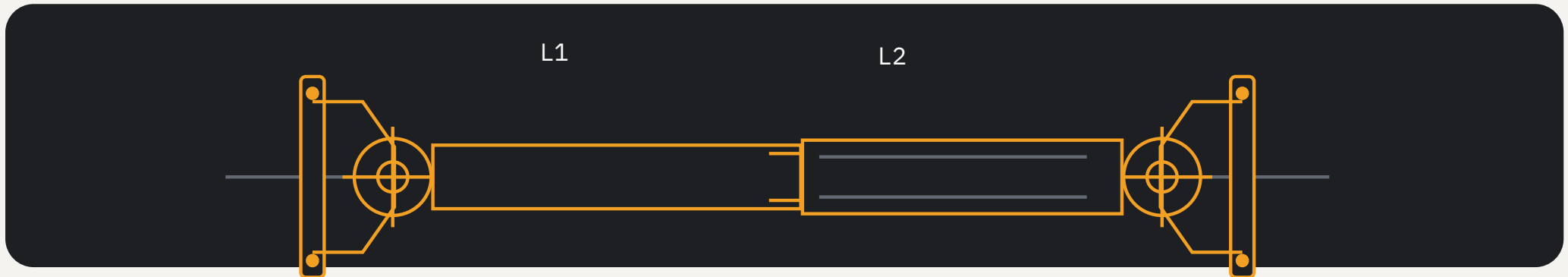
220



Intermediate tube shaft

Define the working length

L1 is the compressed length. L2 is the maximum possible length compensation. The working length is the distance between the drive and output interfaces. For a fixed shaft, confirm the interface-to-interface dimension on the agreed drawing.



The source gives $EB_{Lopt} = L1 + 0.5 \times L2$. Treat this as an initial layout reference; minimum spline engagement and the permitted operating stroke need engineering confirmation.

Reference size families

Family limits are broad source ranges. Use the individual series tables for exact ratings and dimensions.

Family	Swing Ø / mm	MI / Nm	Reference series
S	≤ 76	≤ 600	07600
M	100-144	1 400-6 000	10000-14400
L	158-204	8 800-20 000	15800-20400
XL	220-315	26 000-143 000	21500-31510
XXL	350-620	210 000-1 250 000	35000-62000
XXL+	680 and above	1 950 000 and above	68000 / 75000 / 84000

Series / reference ratings

Ml = bearing torque; Mw = reversing fatigue torque; Gl = joint performance factor. Ml is not a continuous service torque. The source does not tabulate pulsating fatigue torque Ms here.

Series	Family	Swing Ø / mm	Ml / Nm	Mw / Nm	Gl / Nm
07600	S	76	600	300	220
10000	M	100	1 400	700	660
11600	M	116	3 000	1 500	990
12600	M	126	5 300	2 300	1 780
14400	M	144	6 000	2 900	2 070
15800	L	158	8 800	4 400	2 400
17200	L	172	12 500	5 100	3 500
17800	L	178	17 000	8 500	4 600
20400	L	204	20 000	11 000	6 800
21500	XL	220	26 000	13 000	8 050
21510	XL	220	29 000	14 500	8 350
22580	XL	225	45 000	23 000	12 050

Series / reference ratings

Ml = bearing torque; Mw = reversing fatigue torque; Gl = joint performance factor. Ml is not a continuous service torque. The source does not tabulate pulsating fatigue torque Ms here.

Series	Family	Swing Ø / mm	Ml / Nm	Mw / Nm	Gl / Nm
25080	XL	250	70 000	35 000	18 650
28580	XL	285	100 000	50 000	26 200
31510	XL	315	143 000	70 000	28 140
35000	XXL	350	210 000	100 000	40 300
39000	XXL	390	300 000	150 000	56 800
44000	XXL	440	500 000	250 000	81 500
49000	XXL	490	700 000	345 000	112 000
55000	XXL	550	1 000 000	500 000	154 000
62000	XXL	620	1 250 000	625 000	210 000
68000	XXL+	680	1 950 000	950 000	320 000
75000	XXL+	750	2 650 000	1 350 000	750 000
84000	XXL+	840	3 900 000	1 850 000	2 230 000

Configuration dimensions

Reference sizes in mm. A dash means the source gives no value; it does not mean zero. Tube entries are source tube sizes, not wall thicknesses. Minimum lengths are not universal order lengths.

Series	100 L1 min	100 L2 min	100 tube Ø	110 L1 min	110 L2 min	110 L1 max	110 L2 max	130 L1 min	130 tube Ø
07600	250	40	50	214	15	249	40	190	50
10000	421	110	50/76.2	240	15	420	110	218	50/76.2
11600	451	110	70/90	290	30	450	110	278	70/90
12600	536	110	90	340	40	535	110	309	90
14400	572	110	100	409	45	571	110	369	100
15800	630	180	100	400	35	559	110	355	120
17200	566	110	120	430	40	565	110	400	120
17800	661	110	120	450	40	660	110	353	120

Configuration dimensions

Reference sizes in mm. A dash means the source gives no value; it does not mean zero. Tube entries are source tube sizes, not wall thicknesses. Minimum lengths are not universal order lengths.

Series	100 L1 min	100 L2 min	100 tube Ø	110 L1 min	110 L2 min	110 L1 max	110 L2 max	130 L1 min	130 tube Ø
20400	746	110	140	480	40	745	110	440	140
21500	797	150	144	551	50	796	150	506	144
21510	775	140	150	580	40	650	110	538	150
22580	900	110	160/170	585	40	899	140	615	160/170
25080	995	140	180	645	40	994	140	680	180
28580	1115	140	200	990	50	1114	140	760	200
31510	1205	140	219	980	100	1204	140	890	215
35000	1295	150	245	1175	50	1294	150	950	245

Configuration dimensions

Reference sizes in mm. A dash means the source gives no value; it does not mean zero. Tube entries are source tube sizes, not wall thicknesses. Minimum lengths are not universal order lengths.

Series	100 L1 min	100 L2 min	100 tube Ø	110 L1 min	110 L2 min	110 L1 max	110 L2 max	130 L1 min	130 tube Ø
39000	1450	170	273	1140	80	1449	170	1040	273
44000	1660	190	325	1300	70	1659	190	1250	324
49000	1810	190	351	1300	50	1809	190	1360	355
55000	1965	240	402	1770	55	1964	240	1480	406
62000	2240	250	445	2050	55	2239	250	1690	445

Series	105 L1 min	105 L2 min	105 tube Ø	135 L1 min	135 tube Ø
68000	3250	250	559	1950	559
75000	4000	250	609	2400	609
84000	4250	250	660	2700	660

Series / compatible interface codes

Source notation: flange diameter - number of holes - hole diameter. Values in parentheses describe the face key. Confirm the full interface drawing; diameter alone does not establish interchangeability.

Series	DIN	SAE	Cross serration	Face key	Hirth
07600	75-6-6 90-4-8	87-4-8	-	-	-
10000	90-4-8 100-6-8 100-8-8 120-8-8 120-8-10	87-4-8 96.8-4-9.6 119-4-11.1	100-4-8.5 122-4-11	-	-
11600	100-6-8 120-8-8 120-8-10 150-8-10 150-8-12	119-4-11.1 149-4-12.7	122-4-11	-	-
12600	120-8-10 150-8-12 180-8-10 180-8-14	146-4-12.7	122-4-11	-	-
14400	150-8-12 180-8-14	174.8-8-9.6	122-4-11 150-4-13	-	-
15800	150-8-12 180-8-14 180-8-16 180-10-16	174.8-8-9.6 203.2-8-9.6 203.2-12-11.1	150-4-13 180-4-15	-	-
17200	180-8-14 180-8-16 180-10-16 225-8-16	203.2-8-9.6 203.2-12- 11.1	150-4-13 180-4-15	-	-
17800	180-8-14 180-8-16 180-10-16 225-8-16 250-8-18	203.2-8-9.6 203.2-12- 11.1	150-4-13 180-4-15	-	-

Series / compatible interface codes

Source notation: flange diameter - number of holes - hole diameter. Values in parentheses describe the face key. Confirm the full interface drawing; diameter alone does not establish interchangeability.

Series	DIN	SAE	Cross serration	Face key	Hirth
20400	180-8-14 180-8-16 180-10-16 225-8-16 250-8-18	203.2-12- 11.1 244.5-8-16.1	180-4-15	-	-
21500	225-8-16 250-8-18 285-8-20	-	-	225-8-17 (32x9)	-
21510	225-8-16 250-8-18 285-8-20	-	-	225-8-17 (32x9) 250-8-19 (40x12.5)	-
22580	225-8-16 250-8-18 285-8-20	-	-	225-8-17 (32x9) 250-8-19 (40x12.5) 285-8-21 (40x15)	-
25080	250-8-18 285-8-20 315-8-22	-	-	250-8-19 (40x12) 285-8-21 (40x15)	-
28580	285-8-20 315-8-22	-	-	285-8-21 (40x15) 315-10-23 (40x15)	-
31510	315-8-22 350-10-22	-	-	315-10-23 (40x15) 350-10-23 (50x16)	-
35000	350-10-22 390-10-24	-	-	350-10-23 (50x16) 390-10-25 (70x18)	350-12-1116 390-12-1118

Series / compatible interface codes

Source notation: flange diameter - number of holes - hole diameter. Values in parentheses describe the face key. Confirm the full interface drawing; diameter alone does not establish interchangeability.

Series	DIN	SAE	Cross serration	Face key	Hirth
39000	390-10-24 435-10-27	-	-	390-10-25 (70x18) 435-16-28 (80x20)	390-12-1118 435-16-1118
44000	435-10-27	-	-	435-16-28 (80x20) 480-16-31 (90x22.5)	435-16-1118 480-16-1120
49000	-	-	-	480-16-31 (90x22.5) 550-16-31 (100x22.5)	480-16-1120 550-16-24
55000	-	-	-	550-16-31 (100x22.5) 620-16-38 (100x25)	550-11-1122 620-24-26
62000	-	-	-	620-16-38 (100x25)	620-6 680-24-33
68000	-	-	-	-	680-24-33
75000	-	-	-	-	750-24-33
84000	-	-	-	-	840-24-38

08 / DIN / ISO 7646

Flange interface dimensions

DF flange diameter · DC centering diameter · EC centering depth · PCD bolt circle · DB hole diameter · N holes · A2 hole angle (degrees) · EKW1 key width · EKH key height · Z teeth. Lengths in mm.

DF	DC	EC	PCD	DB	N	A2
75	42	2.2	62	6	6	60
90	47	2.5	74.5	8	4	90
100	57	3	84	8	6	60
120	75	3	101.5	8	8	45
120	75	3	101.5	10	8	45
150	90	3	130	12	8	45
180	110	3	155.5	14	8	45
180	110	3	155.5	16	10	36
210	140	5	185	13	10	36
225	140	5	196	16	8	45
250	140	6	218	18	8	45
285	175	7	245	20	8	45
315	175	7	280	22	8	45
350	220	7	310	22	10	36
390	250	8	345	24	10	36
435	280	10	385	27	10	36

08 / DIN WITH FACE KEY

Flange interface dimensions

DF flange diameter · DC centering diameter · EC centering depth · PCD bolt circle · DB hole diameter · N holes · A2 hole angle (degrees) · EKW1 key width · EKH key height · Z teeth. Lengths in mm.

DF	DC	EC	PCD	DB	N	EKW1	EKH	A2
225	105	5	196	17	8	32	9	45
250	105	6	218	19	8	40	12.5	45
285	125	7	245	21	8	40	15	45
315	130	8	280	23	10	40	15	30
350	155	8	310	23	10	50	16	30
390	170	8	345	25	10	70	18	30
435	190	12	385	28	16	80	20	20
480	205	12	425	31	16	90	22.5	20
550	250	12	492	31	16	100	22.5	20
620	380	12	555	38	16	100	25	20

08 / SAE / ISO 7647

Flange interface dimensions

DF flange diameter · DC centering diameter · EC centering depth · PCD bolt circle · DB hole diameter · N holes · A2 hole angle (degrees) · EKW1 key width · EKH key height · Z teeth. Lengths in mm.

DF	DC	EC	PCD	DB	N	A2
87	57.15	1.5	69.87	8	4	100/80
96.8	60.32	1.5	79.37	9.5	4	100/80
119	69.85	1.5	95.27	11.1	4	100/80
149	95.25	1.5	120.65	12.7	4	100/80
174.8	168.22	3	155.57	9.6	8	45
203.2	196.82	3	184.15	9.6	8	45
203.2	196.82	3	184.15	11.1	12	22.5 (4x3)
247.7	177.8	3	209.5	16	8	45

08 / HIRTH SERRATION

Flange interface dimensions

DF flange diameter · DC centering diameter · EC centering depth · PCD bolt circle · DB hole diameter · N holes · A2 hole angle (degrees) · EKW1 key width · EKH key height · Z teeth. Lengths in mm.

DF	PCD	DB	N	Z	A2
225	200	12	8	48	45
250	225	14	8	48	45
285	255	14	10	60	36
315	280	16	10	60	36
350	315	16	12	72	30
390	350	18	12	72	30
435	395	18	16	96	22.5
480	445	20	16	96	22.5
550	510	22	16	96	22.5
620	565	26	24	120	15

08 / CROSS SERRATION / ISO 12667

Flange interface dimensions

DF flange diameter · DC centering diameter · EC centering depth · PCD bolt circle · DB hole diameter · N holes · A2 hole angle (degrees) · EKW1 key width · EKH key height · Z teeth. Lengths in mm.

DF	PCD	DB	N	A2
100	84	8.5	4	110/70
122	100	11	4	110/70
150	130	13	4	110/70
180	150	15	4	110/70
200	165	15	4	110/70

Complete the interface

01

Companion flange

Match the shaft/hub attachment and the complete flange geometry.

02

Positive-locking interface

Face keys, serrations or special geometry require an agreed drawing and torque verification.

03

Locking disc

Review shaft/hub tolerances, contact surfaces and assembly method.

04

Quick-release connection

For repeated changeovers; agree the locking arrangement and acceptance checks.

05

Roll-end coupling box

Review the roll-side geometry, wear parts and changeover sequence.

06

Flange bolts

The source specifies strength class 10.9. Verify the fastener specification and tightening procedure for the actual assembly.

Torque before size

The source estimates nominal torque as $M = 9555 \times P / n$, with P in kW and n in rpm, giving M in Nm. Then assess start-up, shock, reversing and fatigue loads. A single nominal power value cannot define the shaft.

Duty	K1	Source application examples
Light	1.1-1.5	Continuous generators, centrifugal pumps, printing
Medium	1.5-2	Rod/bar mills, non-continuous generators, primary rail drives
Heavy	2-3	Presses, construction machinery, roller tables
Very heavy	3-6	Reversing roller tables, coilers, straightening machines
Extreme	6-10	Heavy main rolling mills, plate shears

$M_{\text{shock}} = K1 \times M$. Check against the relevant fatigue rating (M_w for reversing, M_s for pulsating duty). These source factors are initial estimates, not a substitute for the measured load spectrum.

Bearing life & operating angle

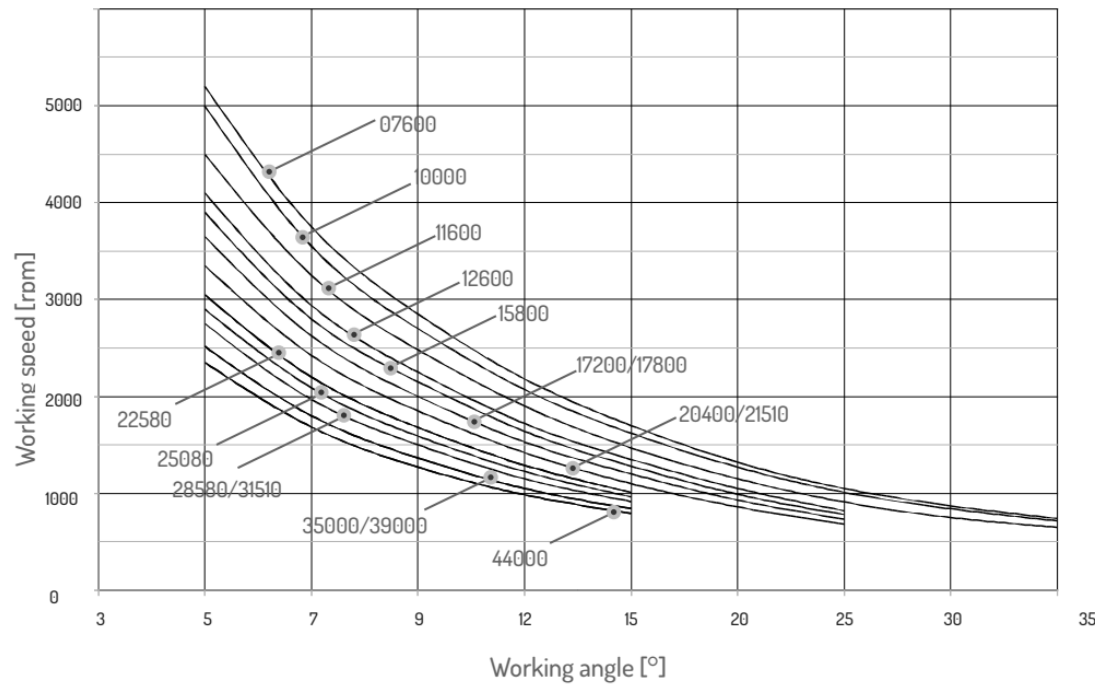
Bearing-life assessment depends on torque, speed, angle, joint performance factor, shock, lubrication and the duty cycle. The source gives drive shock factors $K = 1$ for an electric motor and $K = 1.2$ for a diesel engine. A theoretical life is not a service-life guarantee.

$$L_h = 1.5e7 / (n * \beta) * [G_l / (M * K)]^{3.33}$$

Assess strength and bearing life together. Confirm lubricant, relubrication interval, temperature, contamination and overload frequency. Maintenance-free and coated versions are configuration options in the source, not default properties of every shaft.

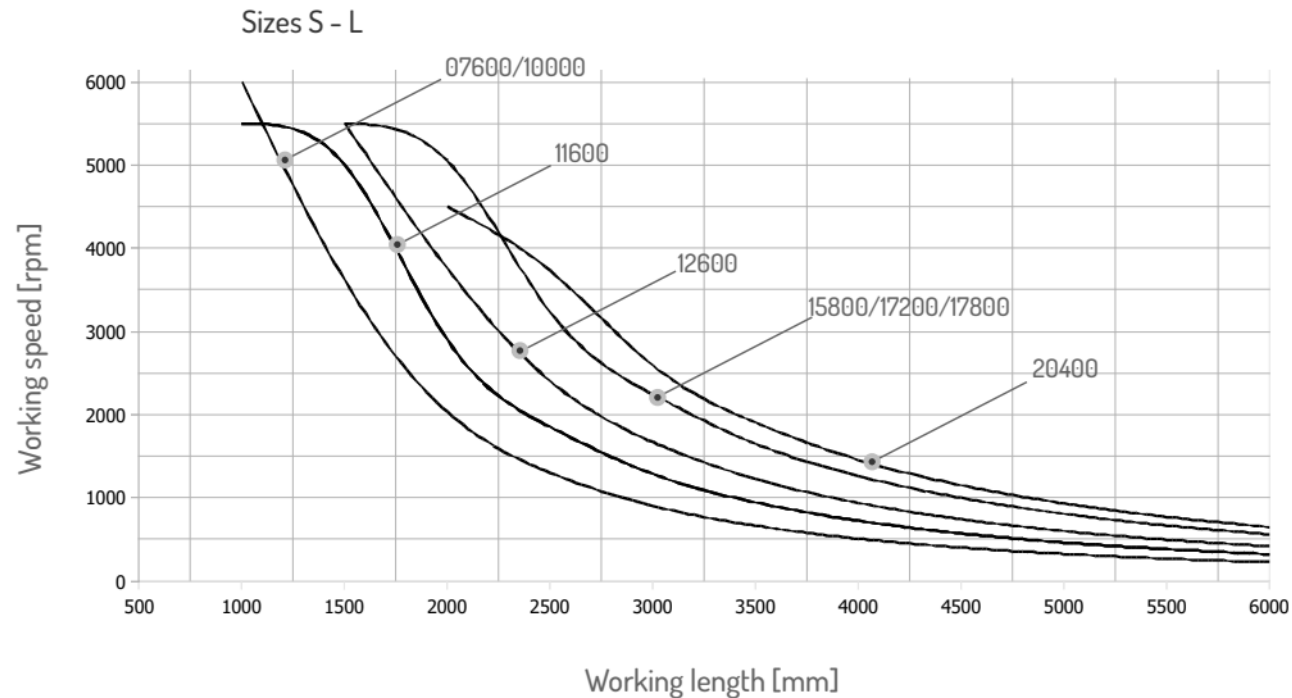
Source 10.4 / L_h [h] · n [rpm] · β [deg] · G_l & M [Nm]

Speed versus working angle



Original reference chart, reproduced from source section 10.5.1. English axes: working speed in rpm; working angle in degrees. The curves are for the identified source series and are not permission to operate an arbitrary shaft.

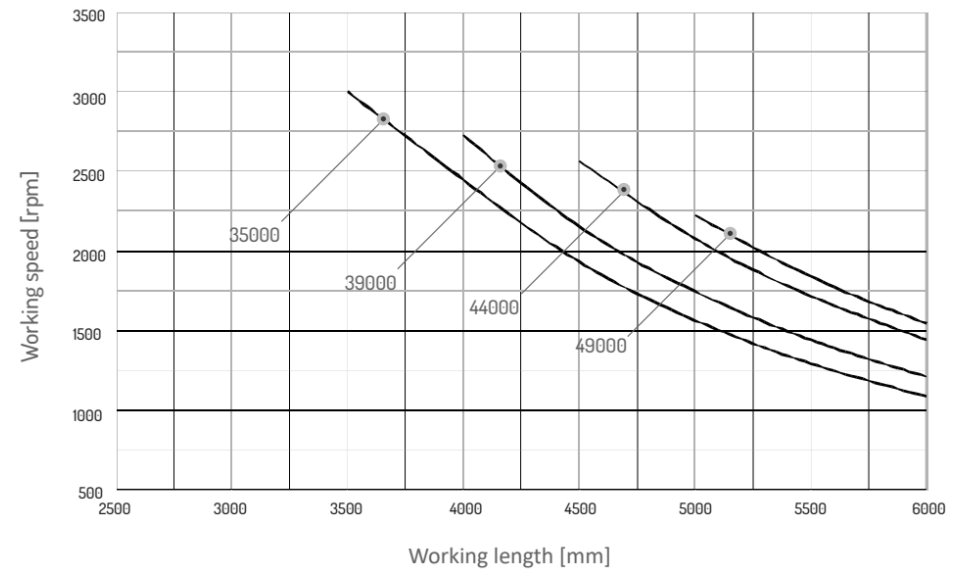
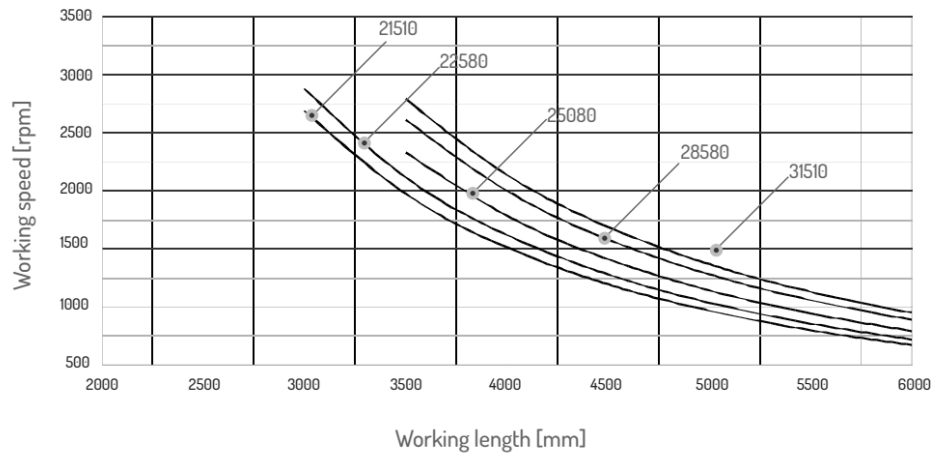
Critical bending speed



Original source curves, section 10.5.2. English axes: working speed in rpm; working length in mm. Long and fast-running shafts require an assembly-specific dynamic assessment. The chart is a selection aid, not a safe-speed certificate.

14 / CRITICAL SPEED / XL & XXL

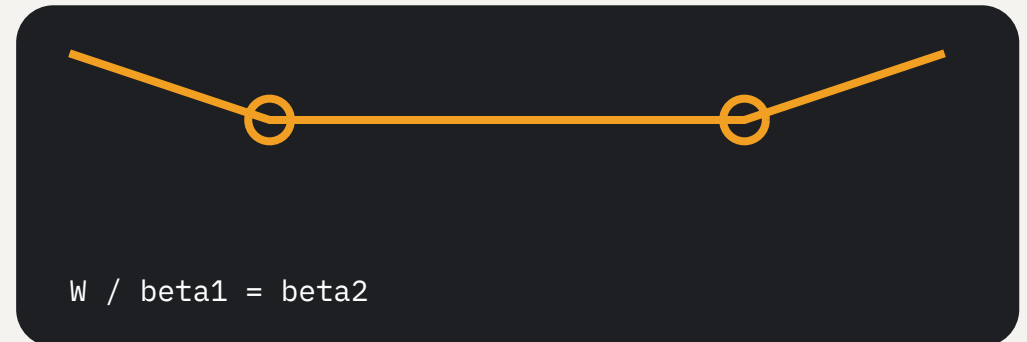
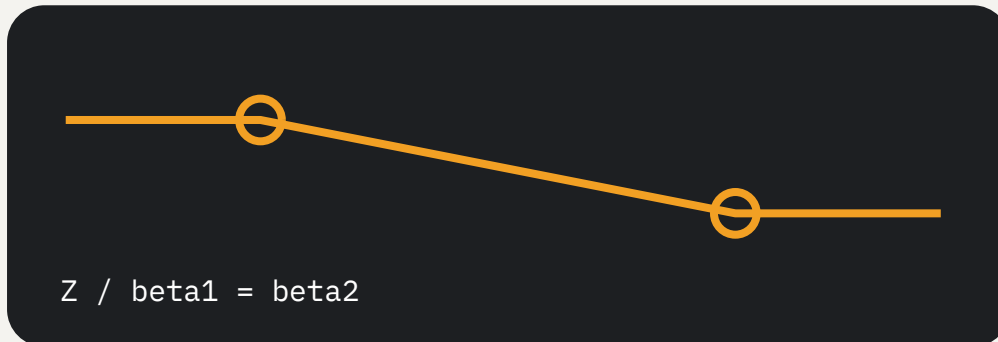
Critical bending speed



Original source curves, section 10.5.2. English axes: working speed in rpm; working length in mm. Long and fast-running shafts require an assembly-specific dynamic assessment. The chart is a selection aid, not a safe-speed certificate.

Joint phasing & drive geometry

A single universal joint produces non-uniform output speed at an angle. For a two-joint shaft, review equal working angles, yoke phasing and the Z or W arrangement. A three-dimensional installation needs a full spatial geometry check.



The source lists maximum angle differences of 3° at low speed and 1.5° at high speed, but does not define those speed bands. Confirm permissible angles and phasing for the actual shaft; do not apply those figures as universal limits.

Balance & axial effects

Agree the balance requirement, operating speed, assembly condition, mounting and report before work. Balancing does not correct worn joints, bent tubes or incorrect phasing. ALWAZEN service scope is confirmed separately from this source range.

ASSEMBLY / SPEED / MOUNTING / ACCEPTANCE / RECORD

Sliding splines under torque produce axial reaction forces. The source uses friction coefficients 0.11 for steel/steel and 0.07 for a coated spline. Confirm coating, lubrication, spline engagement and support reactions. Grease pressure can create additional axial force.

This catalogue covers a source product range. Workshop capacity, stock, delivery and the acceptance of a specific shaft are confirmed separately.

From inspection to handover

01

Inspect

Identify the shaft, dimensions, play, straightness, splines and interfaces.

02

Agree

Repair or replacement, drawing, components, tolerances and work scope.

03

Complete

Perform the agreed manufacture or restoration and assembly operations.

04

Verify

Check geometry, connections and balance against agreed acceptance criteria.

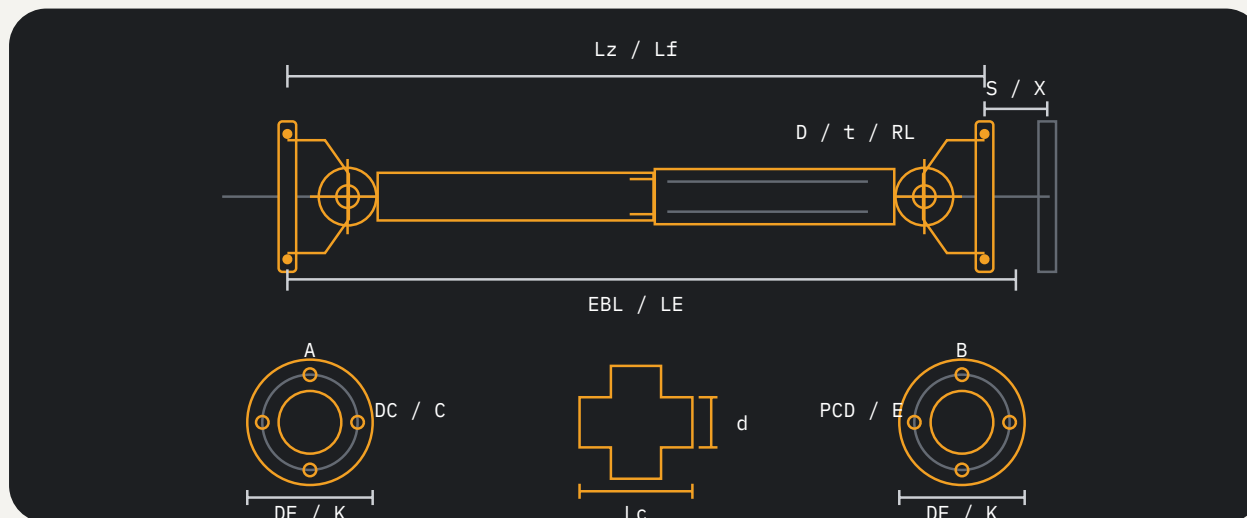
18 / TECHNICAL REQUEST

Industrial shaft / project brief

Send the information available. Missing data can be identified during the technical review.

- | | |
|----|--|
| 01 | Equipment / application / existing part marking |
| 02 | Nominal, maximum and reversing torque; power |
| 03 | Operating / maximum speed; duty cycle |
| 04 | Compressed, installed and maximum length; stroke |
| 05 | Flange drawings: DF, DC, PCD, DB, N and key / teeth |
| 06 | Angles in both planes; phasing; bearing positions |
| 07 | Temperature, contamination, lubrication and guarding |
| 08 | Existing damage, vibration history and photographs |
| 09 | Quantity, drawing revision and requested delivery date |
| 10 | Acceptance criteria, balance requirement and documents |

Measure the shaft and both connections



Schematic only; all dimensions in mm. L_c is the overall cross span, d the bearing cup diameter. Mark the measurement convention on the actual drawing.

L_z / L_f is the fully compressed interface-to-interface length; EBL / LE is the installed length. Required travel S / X does not establish permitted spline engagement. Confirm the usable stroke on the drawing.

Parameter	Value
Compressed length / L_z / L_f	_____
Installed length / EBL / LE	_____
Required axial travel / S / X	_____
Tube outside diameter / D	_____
Tube wall thickness / t	_____
Tube length / RL	_____
Cross overall span / L_c	_____
Bearing cup diameter / d	_____

Connection A / Connection B

SAE, DIN and XS names are identification clues. Record male or female centering, bolt geometry and any face teeth for each end. Confirm Mechanics / Wing-Style geometry from its own drawing.

Parameter	End A	End B
Connection type	_____	_____
Flange outside diameter / DF / K	_____	_____
Centering diameter / DC / C	_____	_____
Centering geometry	_____	_____
Bolt circle diameter / PCD / E	_____	_____
Number of holes / N	_____	_____
Hole diameter / DB	_____	_____
Flange / yoke axial height / H	_____	_____

Configurations and connection styles

01

Telescopic

Specify compressed length, installed length and required travel.

02

Fixed length

Specify the interface distance and installation space.

03

Short coupling

Record the minimum mounting envelope and both connections.

04

Multi-section

Provide section lengths and positions of intermediate supports.

05

Double Cardan

Confirm centering, joint geometry and permissible operating angles.

06

Wing-Style / Mechanics

Identify the attachment geometry; flange diameter alone is insufficient.

Selection also needs load history, shock and reversing duty, speed and both joint angles. Agree lubrication and inspection intervals for the selected assembly. For vibration, record speed, load, onset and previous repairs; balancing does not replace defect inspection. For off-highway equipment, identify the machine: wheel loader, telehandler, harvester, forestry or mining equipment.

Source & edition

Reference tables retain WiCHMANN 2023 identifiers. Additional sources inform measurement and selection checklists. They do not establish supplier authorization, interchangeability or ALWAZEN performance ratings. Confirm current requirements and drawings for the project. Reviewed 06.10.2026.

Source discrepancies: Hirth codes containing 1116 / 1118 / 1120 / 1122 and the incomplete 620-6 are retained as printed. The series matrix lists SAE 244.5 while the flange table lists 247.7. These entries require a confirmed drawing and must not be used as machining dimensions.

01 / WiCHMANN / Industry Catalogue 2023

02 / Cardan Service / Welte - measurement sheet

03 / Welte - drive shaft request

04 / Welte - configurations and connections

05 / Tirsan Kardan - product configurations

06 / Dana / Spicer - off-highway applications

07 / ELBE - industrial questionnaire

08 / ELBE - technical selection and duty

09 / ELBE - Wing-Style connections

10 / VATAN - cardan shafts

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