

Precision shafts for linear motion

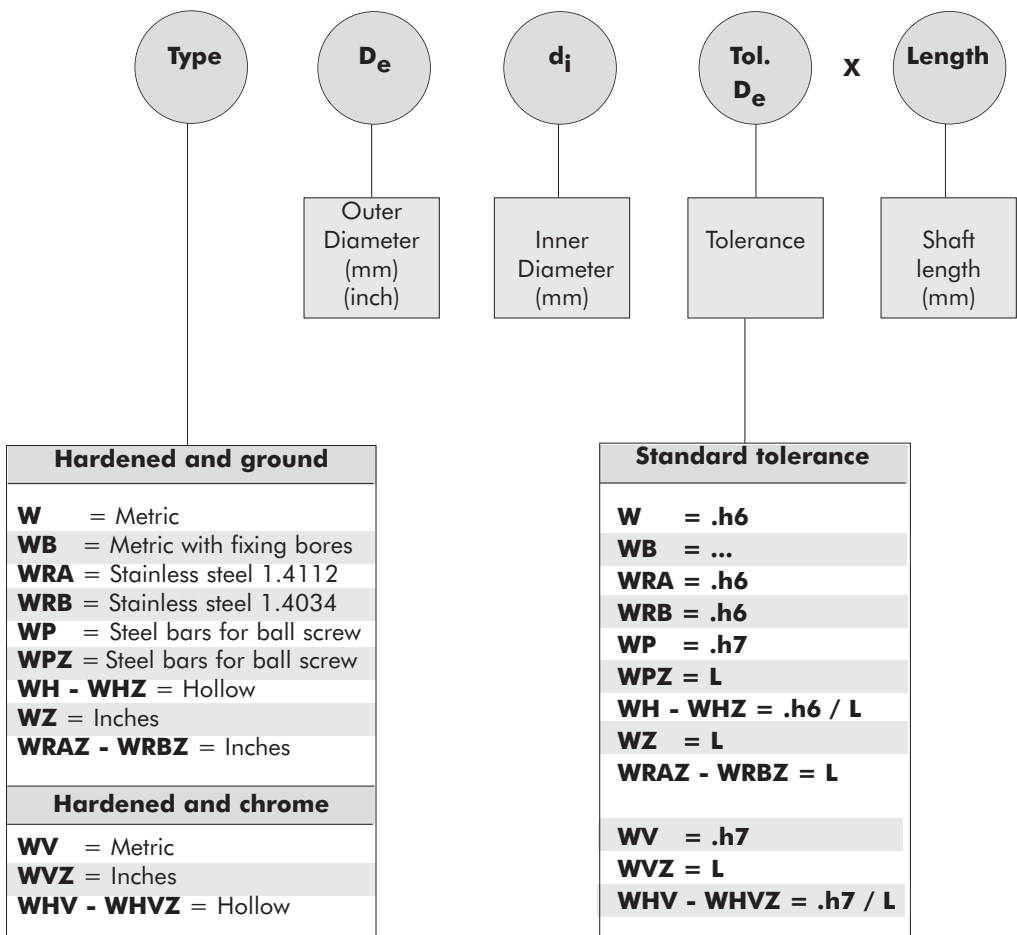
Technical section	4
Dimension table	7
W Induction hardened and ground shafts	8
WZ Induction hardened and ground shafts in inches	9
WV Induction hardened and chrome plated shafts	10
WVZ Induction hardened and chrome plated shafts in inches	11
WRA Induction hardened stainless steel shafts	12
WRB Induction hardened stainless steel shafts	13
WRAZ - WRBZ Induction hardened stainless steel shafts in inches	14
WH - WHZ Induction hardened hollow shafts	15
WHV - WHVZ Induction hardened and chrome plated hollow shafts	16
WP - WPZ Deep case ground shafts for ball screws	17
WB Hardened and ground shafts, predrilled and tapped fixing bores	18
Shaft diameter tolerances	20

Steel interchange								
DIN No.	Material	STAS NF33101	AFNOR 970 EN 10083	B.S. 7845 1449	UNI	JIS 1050	GOST	AISI SAE ASTM
17212								
Cf53	1.1213	-	-	-	-	-	-	-
17200								
C55	1.0535	OLC55	1C55	070M55	C55	S55C	55	1055
			AF70C55		1C55			
Ck55	1.1203	OLC55X	2C55	060A57	C55	S55C	55	1055
			XC55H1	070M55				
17230								
100Cr6	1.3505	Ru1	100Cr6	535 4 H 99	100Cr6	SUJ 2	SH 15	52100
X46Cr13	1.4034	40Cr130	Z44Cr13	(420S45)	X40Cr14	-	40Cr13	
X90CrMoV18	1.4112	90VMoCr180	-	-	-	-	-	440B

Steel designation	Chemical composition, % by weight										Hardenability	
	C	Si max	Mn max	P max	S max	Cr	Mo	Ni max	Cu max	V	Brinell hardness HB max	Surface min HRC
Cf53	0.50 0.57	0.15 0.35	0.40 0.70	0.025	0.035	-	-	-	-	-	223	60
C55	0.52 0.60	0.40	0.60 0.90	0.045	0.045	-	max 0.1	-	-	-	229	60
Ck55	0.52 0.60	0.40	0.60 0.90	0.035	0.035	max 0.4	max 0.1	max 0.4	-	-	229	60
100Cr6	0.90 1.05	0.15 0.35	0.25 0.45	0.030	0.025	1.35 1.65	-	0.30	0.30	-	207 ⁽¹⁾	60
X46Cr13	0.42 0.50	1.00	1.00	0.045	0.030	12.5 14.5	-	-	-	-	-	53
X90CrMoV18	0.85 0.95	1.00	1.00	0.040	0.020	17.0 19.0	0.9 1.3	-	-	0.07 0.12	-	55

(1) spherodized annealing

Order designation system for shafts



Ordering example:

Standard tolerance: precision shaft hardened and ground $\varnothing$ 40, length 2500, tolerance **h6** = **W40 x 2500**.

Special tolerance: stainless steel precision shaft $\varnothing$ 30, length 1350, tolerance **g6** = **WRA 30 g6 x 1350**.

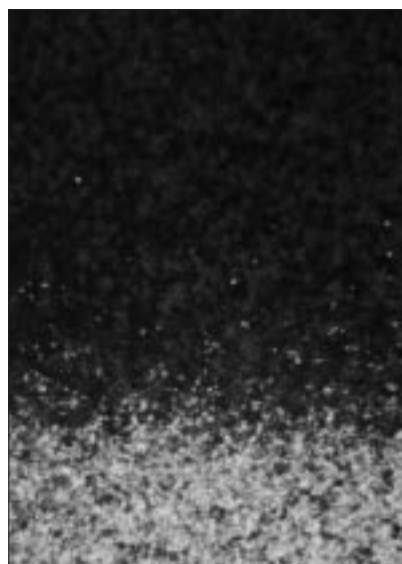
APPLICATIONS					
W,WZ,WB	WRA	WRB	WH - WHZ	WV	WP - WPZ
Is the most commonly used as a linear ball bearing raceway. It has suitable hardness and is cost effective.	Material used for its resistance to corrosion. Its hardness is medium high.	Similar to WRA type, with a lower chemical resistance to corrosion. Less expensive.	Used for application requiring low weight or the ability to pass air, fluid or cables in required.	Characteristics similar to W type, but resistant to corrosion due to the addition of a chrome layer.	Deephardened and ground steel bars for ball screw, with hardening depth up to 6,5 millimeter. Produced upon customer demand.

HEAT TREATMENT

Precision shafts are induction hardened; this treatment ensures a uniform surface hardness of HV 697 - HRC 60 both in radial and axial direction.

The stainless steels are subjected to a more stringent process to prevent excessive internal stresses, while ensuring a surface hardness of HV 595 - HRC 55.

Microphotograph showing the heat treated zone.



Shaft outer surface showing a martensitic structure HRC 62±2.

Transition from hardened layer to core material showing

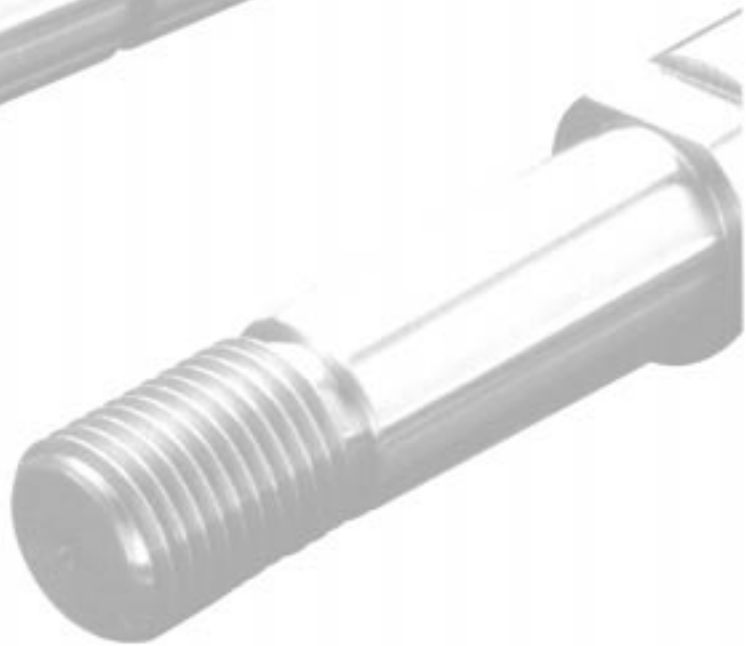
Martensite
Troostite

Core Structure

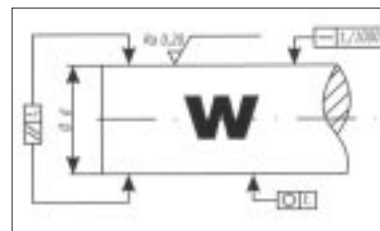
Pearlite
Ferrite

Pictures showing controlled hardened zone





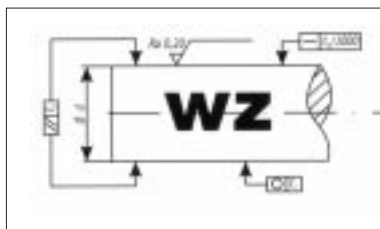
Dimension Tables


Series W

Induction hardened and
ground shafts.
(Ck 55 or Cf 53)

Shaft diameter d mm	Weight kg/m	Shaft designation	Standard length mm	Hardening depth Rht DIN 6773 mm	Standard tolerance ISO h6 μm	Roundness t1 μm	Parallelism t2 μm	Straightness t3 mm/m
3	0,055	W 3	1100	0.4 - 0.6	0 - 6	3	4	0,16
4	0,1	W 4	2100	0.5 - 0.8	0 - 8	3	4	0,16
5	0,16	W 5	3200	0.5 - 0.8	0 - 8	4	6	0,16
6	0,23	W 6	6000	0.5 - 0.8	0 - 8	4	6	0,16
8	0,4	W 8	6000	0.6 - 0.9	0 - 9	4	6	0,16
10	0,62	W 10	6000	0.7 - 1.0	0 - 9	4	6	0,12
12	0,89	W 12	6000	0.8 - 1.2	0 - 11	5	8	0,12
13	1,04	W 13	6000	0.8 - 1.2	0 - 11	5	8	0,12
14	1,21	W 14	6000	0.9 - 1.3	0 - 11	5	8	0,12
15	1,39	W 15	6000	1.0 - 1.4	0 - 11	5	8	0,12
16	1,58	W 16	6000	1.1 - 1.5	0 - 11	5	8	0,1
18	2	W 18	6000	1.1 - 1.5	0 - 11	5	8	0,1
20	2,47	W 20	6000	1.2 - 1.5	0 - 13	6	8	0,1
22	2,98	W 22	6000	1.2 - 1.5	0 - 13	6	8	0,1
24	3,55	W 24	6000	1.4 - 1.6	0 - 13	6	8	0,1
25	3,85	W 25	6000	1.5 - 1.7	0 - 13	6	9	0,1
28	4,83	W 28	6000	1.5 - 1.8	0 - 13	6	9	0,1
30	5,55	W 30	6000	1.5 - 1.9	0 - 13	6	9	0,1
32	6,31	W 32	6000	1.5 - 1.9	0 - 16	7	11	0,1
35	7,55	W 35	6000	1.8 - 1.9	0 - 16	7	11	0,1
40	9,87	W 40	6000	1.6 - 2.0	0 - 16	7	11	0,1
45	12,5	W 45	6000	1.6 - 2.0	0 - 16	7	11	0,1
50	15,4	W 50	6000	2.2 - 2.6	0 - 16	7	11	0,1
55	18,64	W 55	6000	2.2 - 2.6	0 - 19	8	13	0,1
60	22,2	W 60	6000	2.2 - 2.6	0 - 19	8	13	0,1
70	30,2	W 70	6000	2.2 - 2.6	0 - 19	8	13	0,1
75	34,7	W 75	6000	2.2 - 2.6	0 - 19	8	13	0,1
80	39,5	W 80	6000	2.2 - 2.6	0 - 19	8	13	0,1
90	49,92	W 90	6000	2.2 - 3.2	0 - 22	8	13	0,2
100	61,62	W100	6000	2.2 - 3.2	0 - 22	8	13	0,2

- Special tolerances and diameters are available upon request.
- Max available length 8200 mm upon request (for shafts ≥ da.16).
- Surface hardness: 60-64 HRC.
- Length tolerance: +200 / -0 mm.



Series WZ

Induction hardened and
ground shafts in inches.
(Ck 55 or Cf 53)

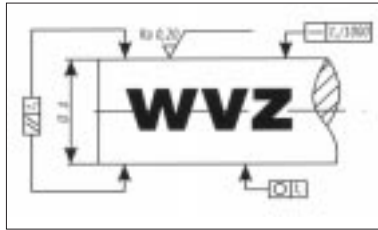
Shaft diameter d	Shaft design- nation	Standard length	Hardening depth Rht DIN6773	Tolerance class "L"	Weight	Roundness t1	Parallelism t2	Straightness t3
mm		inch	inch	inch	kg/m	inch	inch	inch/m
6,35	WZ 1/4	237	0.019-0.031	-0.0005/-0.0010	0,25	0,0002	0,0002	0,008
9,525	WZ 3/8	237	0.027-0.039	-0.0005/-0.0010	0,56	0,0002	0,0002	0,008
12,7	WZ 1/2	237	0.031-0.047	-0.0005/-0.0010	0,99	0,0002	0,0003	0,008
15,875	WZ 5/8	237	0.043-0.059	-0.0005/-0.0010	1,55	0,0002	0,0003	0,008
19,05	WZ 3/4	237	0.047-0.059	-0.0005/-0.0010	2,24	0,0002	0,0004	0,008
25,4	WZ 1	237	0.059-0.066	-0.0005/-0.0010	3,97	0,0002	0,0004	0,008
31,75	WZ 1 1/4	237	0.059-0.074	-0.0005/-0.0010	6,22	0,0003	0,0004	0,004
38,1	WZ 1 1/2	237	0.062-0.078	-0.0006/-0.0011	8,95	0,0003	0,0004	0,004
50,8	WZ 2	237	0.086-0.102	-0.0006/-0.0013	15,91	0,0003	0,0004	0,004
57,15	WZ 2 1/4	237	0.086-0.102	-0.0007/-0.0015	20,13	0,0003	0,0005	0,004
63,5	WZ 2 1/2	237	0.086-0.102	-0.0007/-0.0015	24,85	0,0003	0,0005	0,004
76,2	WZ 3	237	0.086-0.102	-0.0008/-0.0017	35,78	0,0003	0,0005	0,004

- Special tolerances and diameters are available upon request.
- Max available length 8200 mm upon request (for shafts $\geq$ da. 5/8).
- Class "S" available upon request.
- Length tolerance: +200 / -0 mm.
- Surface hardness: 60 - 64 HRC.



Shaft diameter d	Weight	Shaft design- ation	Standard length	Hardening depth R _h t DIN 6773	Standard tolerance ISO h7	Roundness	Parallelism	Straightness
mm	kg/m		mm	mm	μm	t1 μm	t2 μm	t3 mm/m
3	0,055	WV 3	1100	0.4 - 0.6	0 - 10	6	10	0,16
4	0,1	WV 4	2100	0.5 - 0.8	0 - 10	6	10	0,16
5	0,16	WV 5	3000	0.5 - 0.8	0 - 12	6	10	0,16
6	0,23	WV 6	6000	0.5 - 0.8	0 - 12	6	10	0,16
8	0,4	WV 8	6000	0.6 - 0.9	0 - 15	6	10	0,16
10	0,62	WV 10	6000	0.7 - 1.0	0 - 15	6	10	0,12
12	0,89	WV 12	6000	0.8 - 1.2	0 - 18	8	12	0,12
13	1,04	WV 13	6000	0.8 - 1.2	0 - 18	8	12	0,12
14	1,21	WV 14	6000	0.9 - 1.3	0 - 18	8	12	0,12
15	1,39	WV 15	6000	1.0 - 1.4	0 - 18	8	12	0,12
16	1,58	WV 16	6000	1.1 - 1.5	0 - 18	8	12	0,1
18	2	WV 18	6000	1.1 - 1.5	0 - 18	8	12	0,1
20	2,47	WV 20	6000	1.2 - 1.5	0 - 21	9	12	0,1
22	2,98	WV 22	6000	1.2 - 1.5	0 - 21	9	12	0,1
24	3,55	WV 24	6000	1.4 - 1.6	0 - 21	9	12	0,1
25	3,85	WV 25	6000	1.5 - 1.7	0 - 21	9	12	0,1
28	4,83	WV 28	6000	1.5 - 1.8	0 - 21	9	12	0,1
30	5,55	WV 30	6000	1.5 - 1.9	0 - 21	9	12	0,1
32	6,31	WV 32	6000	1.5 - 1.9	0 - 25	11	15	0,1
35	7,55	WV 35	6000	1.5 - 1.9	0 - 25	11	15	0,1
40	9,87	WV 40	6000	1.6 - 2.0	0 - 25	11	15	0,1
45	12,5	WV 45	6000	1.6 - 2.0	0 - 25	11	15	0,1
50	15,4	WV 50	6000	2.2 - 2.6	0 - 25	11	15	0,1
55	18,64	WV 55	6000	2.2 - 2.6	0 - 30	12	15	0,1
60	22,2	WV 60	6000	2.2 - 2.6	0 - 30	12	15	0,1
70	30,2	WV 70	6000	2.2 - 2.6	0 - 30	12	15	0,1
75	34,7	WV 75	6000	2.2 - 2.6	0 - 30	12	15	0,1
80	39,5	WV 80	6000	2.2 - 2.6	0 - 30	12	15	0,1
90	49,92	WV 90	6000	2.2 - 3.2	0 - 35	14	17	0,2
100	61,62	WV 100	6000	2.2 - 3.2	0 - 35	14	17	0,2

- Special tolerances and diameters are available upon request.
- Max available length 8200 mm upon request (for shafts $\geq \text{da.16}$).
- Chrome layer thickness: 5 - 12 μm .
- Chrome layer hardness: 900 - 1100 HV 0.1
- Length tolerance: +200 / - 0 mm.

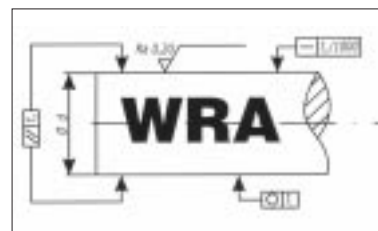


Series WVZ

Induction hardened and
chrome plated shafts
in inches (Ck 55 or Cf 53)

Shaft diameter d	Weight	Shaft design- nation	Standard length	Hardening depth Rht DIN6773	Tolerance class "L"	Roundness t1	Parallelism t2	Straightness t3
mm	kg/m		inch	inch	inch	inch	inch	inch/m
6,35	0,25	WVZ 1/4	237	0.0002/-0.0003	-0.0005/-0.001	0,0002	0,0004	0,008
9,525	0,56	WVZ 3/8	237	0.0003/-0.0004	-0.0005/-0.001	0,0002	0,0004	0,008
12,7	0,99	WVZ 1/2	237	0.0003/-0.0005	-0.0005/-0.001	0,0003	0,0005	0,008
15,875	1,55	WVZ 5/8	237	0.0004/-0.0006	-0.0005/-0.001	0,0004	0,0005	0,008
19,05	2,24	WVZ 3/4	237	0.0005/-0.0006	-0.0005/-0.001	0,0004	0,0005	0,004
25,4	3,97	WVZ 1	237	0.0006/-0.0006	-0.0005/-0.001	0,0004	0,0005	0,004
31,75	6,22	WVZ 1 1/4	237	0.0006/-0.0007	-0.0005/-0.001	0,0004	0,0006	0,004
38,1	8,95	WVZ 1 1/2	237	0.0006/-0.0008	-0.0006/-0.0011	0,0004	0,0006	0,004
50,8	15,91	WVZ 2	237	0.0009/-0.001	-0.0006/-0.0013	0,0004	0,0006	0,004
57,15	20,13	WVZ 2 1/4	237	0.0009/-0.001	-0.0007/-0.0015	0,0005	0,0006	0,004
63,5	24,85	WVZ 2 1/2	237	0.0009/-0.001	-0.0007/-0.0015	0,0005	0,0006	0,004
76,2	35,78	WVZ 3	237	0.0009/-0.001	-0.0008/-0.0017	0,0005	0,0006	0,004

- Special tolerances and diameters are available upon request.
- Chrome layer thickness: 5 - 12 μm .
- Chrome layer hardness: 900 - 1100 HV 0.1
- Length tolerance: +200 / -0 mm.
- Max available length 8200 mm upon request (for shafts $\geq$ da.5/8).

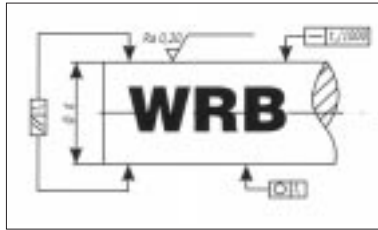


Series WRA

Induction hardened
stainless steel shafts.
(X90 Cr Mo V 18 / W 1.4112)

Shaft diameter d mm	Weight kg/m	Shaft designation	Standard length mm	Hardening depth R _{ht} DIN 50190 mm	Standard tolerance ISO h6 μm	Roundness t1 μm	Parallelism t2 μm	Straightness t3 mm/m
5	0,16	WRA 5	2100	0.5 - 0.8	0 - 8	4	5	0,16
6	0,23	WRA 6	3100	0.5 - 0.8	0 - 8	4	6	0,16
8	0,4	WRA 8	6000	0.6 - 0.9	0 - 9	4	6	0,16
10	0,62	WRA 10	6000	0.7 - 1.0	0 - 9	4	6	0,16
12	0,89	WRA 12	6000	0.8 - 1.2	0 - 11	5	8	0,12
14	1,21	WRA 14	6000	0.9 - 1.3	0 - 11	5	8	0,12
15	1,39	WRA 15	6000	1.1 - 1.5	0 - 11	5	8	0,12
16	1,58	WRA 16	6000	1.1 - 1.5	0 - 11	5	8	0,12
20	2,47	WRA 20	6000	1.2 - 1.6	0 - 13	6	9	0,1
25	3,85	WRA 25	6000	1.5 - 1.7	0 - 13	6	9	0,1
30	5,55	WRA 30	6000	1.5 - 1.9	0 - 13	6	9	0,1
40	9,87	WRA 40	3000	2.5 - 3.0	0 - 16	7	11	0,1
50	15,4	WRA 50	3000	2.7 - 3.2	0 - 16	7	11	0,1
60	22,2	WRA 60	3000	2.9 - 3.3	0 - 19	8	13	0,1

- Special tolerances and diameters are available upon request.
- Length tolerance: +200 / -0 mm.
- Surface hardness: 55 HRC min.

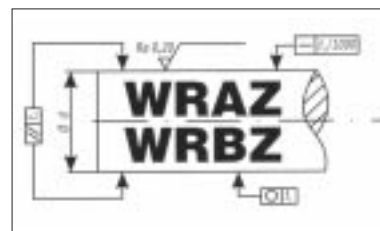


Series WRB

Induction hardened
stainless steel shafts.
(X46 Cr13 / W 1.4034)

Shaft diameter d	Weight	Shaft design- nation	Standard length	Hardening depth R _{ht} DIN 50190	Standard tolerance ISO h6	Roundness t1	Parallelism t2	Straightness t3
mm	kg/m		mm	mm	μm	μm	μm	mm/m
5	0,16	WRB 5	2100	0.5 - 0.8	0 - 8	4	5	0,16
6	0,23	WRB 6	3100	0.5 - 0.8	0 - 8	4	6	0,16
8	0,4	WRB 8	6000	0.6 - 0.9	0 - 9	4	6	0,16
10	0,62	WRB 10	6000	0.7 - 1.0	0 - 9	4	6	0,16
12	0,89	WRB 12	6000	0.8 - 1.2	0 - 11	5	8	0,12
14	1,21	WRB 14	6000	0.9 - 1.3	0 - 11	5	8	0,12
15	1,39	WRB 15	6000	0.9 - 1.3	0 - 11	5	8	0,12
16	1,58	WRB 16	6000	1.1 - 1.5	0 - 11	5	8	0,12
20	2,47	WRB 20	6000	1.2 - 1.5	0 - 13	6	9	0,1
25	3,85	WRB 25	6000	1.5 - 1.7	0 - 13	6	9	0,1
30	5,55	WRB 30	6000	1.5 - 1.9	0 - 13	6	9	0,1
40	9,87	WRB 40	6000	2.5 - 3.0	0 - 16	7	11	0,1
50	15,4	WRB 50	6000	2.7 - 3.2	0 - 16	7	11	0,1
60	22,2	WRB 60	6000	2.9 - 3.3	0 - 19	8	13	0,1

- Special tolerances and diameters are available upon request.
- Length tolerance: +200 / -0 mm.
- Surface hardness: 53 HRCmin.



Series WRAZ - WRBZ

Induction hardened
stainless steel shafts in inches.

WRAZ: X90 Cr Mo V 18 / 1.4112

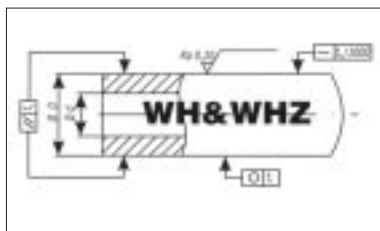
Shaft diameter d	Weight	Shaft designation	Standard length	Hardening depth R _{ht} DIN 50190	Tolerance class "L"	Roundness t1	Parallelism t2	Straightness t3
inch	kg/m		inch	inch	inch	inch	inch	inch/m
1/4	0,25	WRAZ 1/4	123	0.019 - 0.031	-0,0005/-0,001	0,0002	0,0002	0,008
3/8	0,56	WRAZ 3/8	237	0.027 - 0.039	-0,0005/-0,001	0,0002	0,0002	0,008
1/2	0,99	WRAZ 1/2	237	0.031 - 0.047	-0,0005/-0,001	0,0002	0,0003	0,008
5/8	1,55	WRAZ 5/8	237	0.043 - 0.059	-0,0005/-0,001	0,0002	0,0003	0,008
3/4	2,24	WRAZ 3/4	237	0.047 - 0.059	-0,0005/-0,001	0,0002	0,0004	0,004
1	3,97	WRAZ 1	237	0.059 - 0.066	-0,0005/-0,001	0,0002	0,0004	0,004
1 1/4	6,22	WRAZ 1 1/4	237	0.059 - 0.074	-0,0005/-0,001	0,0002	0,0004	0,004
1 1/2	8,95	WRAZ 1 1/2	237	0.094 - 0.114	-0,0005/-0,001	0,0003	0,0004	0,004
2	15,91	WRAZ 2	237	0.106 - 0.125	-0,0006/-0,0011	0,0003	0,0005	0,004
2 1/4	20,13	WRAZ 2 1/4	237	0.114 - 0.129	-0,0006/-0,0013	0,0003	0,0005	0,004
2 1/2	24,85	WRAZ 2 1/2	237	0.114 - 0.129	-0,0007/-0,0015	0,0003	0,0005	0,004
3	35,78	WRAZ 3	237	0.114 - 0.129	-0,0008/-0,0017	0,0003	0,0005	0,004

- Special tolerances and diameters are available upon request.
- Length tolerance: +200 / -0 mm.
- Surface hardness: 55 HRC min.

WRBZ: X46 Cr 13 / 1.4034

Shaft diameter d	Weight	Shaft designation	Standard length	Hardening depth R _{ht} DIN 50190	Tolerance class "L"	Roundness t1	Parallelism t2	Straightness t3
inch	kg/m		inch	inch	inch	inch	inch	inch/m
1/4	0,25	WRBZ 1/4	123	0.019 - 0.031	-0,0005/-0,001	0,0002	0,0002	0,008
3/8	0,56	WRBZ 3/8	237	0.027 - 0.039	-0,0005/-0,001	0,0002	0,0002	0,008
1/2	0,99	WRBZ 1/2	237	0.031 - 0.047	-0,0005/-0,001	0,0002	0,0003	0,008
5/8	1,55	WRBZ 5/8	237	0.043 - 0.059	-0,0005/-0,001	0,0002	0,0003	0,008
3/4	2,24	WRBZ 3/4	237	0.047 - 0.059	-0,0005/-0,001	0,0002	0,0004	0,004
1	3,97	WRBZ 1	237	0.059 - 0.066	-0,0005/-0,001	0,0002	0,0004	0,004
1 1/4	6,22	WRBZ 1 1/4	237	0.059 - 0.074	-0,0005/-0,001	0,0002	0,0004	0,004
1 1/2	8,95	WRBZ 1 1/2	237	0.094 - 0.114	-0,0005/-0,001	0,0003	0,0004	0,004
2	15,91	WRBZ 2	237	0.106 - 0.125	-0,0006/-0,0011	0,0003	0,0005	0,004
2 1/4	20,13	WRBZ 2 1/4	237	0.114 - 0.129	-0,0006/-0,0013	0,0003	0,0005	0,004
2 1/2	24,85	WRBZ 2 1/2	237	0.114 - 0.129	-0,0007/-0,0015	0,0003	0,0005	0,004
3	35,78	WRBZ 3	237	0.114 - 0.129	-0,0008/-0,0017	0,0003	0,0005	0,004

- Special tolerances and diameters are available upon request.
- Length tolerance: +200 / -0 mm.
- Surface hardness: 53 HRC min.



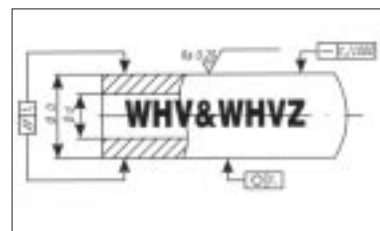
Series WH - WHZ

Induction hardened
hollow shafts.
(Ck55 - 100 Cr6)

Shaft diameter		Shaft designation	Standard length	Hardening depth Rht DIN 6773	Tolerance ISO h6	Weight	Roundness	Parallelism	Straightness
Outer D	Inner d (+/-10%)						t1	t2	t3
mm	mm		mm	mm	μm	kg/m	μm	μm	mm/m
12	4	WH 12	3000	0.6 - 1.3	0 - 11	0,79	5	8	0,12
14	7	WH 14	3000	0.6 - 1.3	0 - 11	0,91	5	8	0,12
16	7	WH 16	3000	0.6 - 1.6	0 - 11	1,28	5	8	0,12
20	14	WH 20	6000	0.9 - 1.6	0 - 13	1,25	6	9	0,1
25	15,6	WH 25	6000	0.9 - 1.8	0 - 13	2,35	6	9	0,1
30	18,3	WH 30	6000	0.9 - 2.0	0 - 13	3,5	6	9	0,1
40	28	WH 40	6000	1.5 - 2.5	0 - 16	4,99	7	11	0,1
50	29,7	WH 50	6000	1.5 - 3.0	0 - 16	9,91	7	11	0,1
60	36	WH 60	6000	2.2 - 3.0	0 - 19	14,2	8	13	0,1
80	57	WH 80	6000	2.2 - 3.0	0 - 19	19,43	8	13	0,1
90	60	WH 90	3000	2.5 - 3.0	0 - 22	27,73	10	16	0,2
100	65	WH100	3000	2.5 - 3.3	0 - 22	35,61	10	16	0,2

Shaft diameter		Shaft designation	Standard length	Hardening depth Rht DIN 6773	Tolerance class "L"	Weight	Roundness	Parallelism	Straightness
Outer D	Inner d (+/-10%)						t1	t2	t3
mm	inch		inch	inch	inch	Kg/m	inch	inch	inch/m
1/2	0,16	WHZ1/2	119	0.023 - 0.051	-0.0005/ -0.00 1	0,90	0.0002	0.0003	0.008
5/8	0,25	WHZ5/8	119	0.023 - 0.051	-0.0005/ -0.00 1	1,30	0.0002	0.0003	0.008
3/4	0,43	WHZ3/4	119	0.035 - 0.062	-0.0005/ -0.00 1	1,4	0.0002	0.0004	0.004
1	0,61	WHZ 1	237	0.035 - 0.070	-0.0005/ -0.00 1	2,5	0.0002	0.0004	0.004
1 1/4	0,72	WHZ1 1/4	237	0.059 - 0.078	-0.0005/ -0.00 1	4,15	0.0002	0.0004	0.004
1 1/2	0,89	WHZ1 1/2	237	0.059 - 0.098	-0.0006/ -0.00 11	5,8	0.0003	0.0004	0.004
2	1,25	WHZ2	237	0.086 - 0.118	-0.0006/ -0.00 13	9,69	0.0003	0.0005	0.004
2 1/2	1,75	WHZ2 1/2	237	0.086 - 0.118	-0.0007/ -0.00 15	12,67	0.0003	0.0005	0.004
3	2	WHZ 3	237	0.086 - 0.118	-0.0008/ -0.00 17	19,88	0.0003	0.0005	0.004

- Special tolerances and diameters are available upon request.
- Length tolerance: +200 / -0 mm.
- Surface hardness: 60 HRC min.


Series WHV - WHVZ

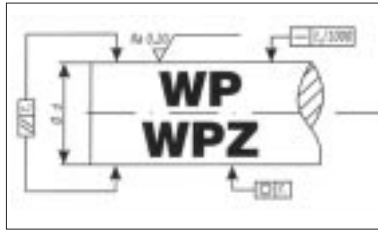
Induction hardened & chrome plated
hollow shafts.
(Ck55 - 100 Cr6)

Shaft diameter		Shaft designation	Standard length	Hardening depth R _h t DIN 6773	Tolerance ISO h7	Weight	Roundness	Parallelism	Straightness
Outer D	Inner d (+/-10%)						t1	t2	t3
mm	mm		mm	mm	μm	kg/m	μm	μm	mm/m
12	4	WHV 12	3000	0.6 - 1.3	0 - 18	0,79	8	12	0,12
14	7	WHV 14	3000	0.6 - 1.3	0 - 18	0,91	8	12	0,12
16	7	WHV 16	3000	0.6 - 1.6	0 - 18	1,28	8	12	0,12
20	14	WHV 20	3000	0.9 - 1.6	0 - 21	1,25	9	12	0,1
25	15,6	WHV 25	6000	0.9 - 1.8	0 - 21	2,35	9	12	0,1
30	18,3	WHV 30	6000	0.9 - 2.0	0 - 21	3,5	9	12	0,1
40	28	WHV 40	6000	1.5 - 2.5	0 - 25	4,99	11	15	0,1
50	29,7	WHV 50	6000	1.5 - 3.0	0 - 25	9,91	11	15	0,1
60	36	WHV 60	6000	2.2 - 3.0	0 - 30	14,2	12	15	0,1
80	57	WHV 80	6000	2.2 - 3.0	0 - 30	19,43	12	15	0,1
90	60	WHV 90	3000	2.5 - 3.0	0 - 35	27,73	14	17	0,2
100	65	WHV100	3000	2.5 - 3.3	0 - 35	35,61	14	17	0,2

- Special tolerances and diameters are available upon request.
- Chrome layer tickness: 5 - 12 μm .
- Chrome layer hardness: 900 - 1100 Hv 0,1.
- Length tolerance: +200 / -0 mm.

Shaft diameter		Shaft designation	Standard length	Hardening depth R _h t DIN 6773	Tolerance class "L"	Weight	Roundness	Parallelism	Straightness
Outer D	Inner d (+/-10%)						t1	t2	t3
mm	inch		inch	inch	inch	Kg/m	inch	inch	inch/m
1/2	0,16	WHVZ1/2	119	0.023 - 0.051	-0.0005/ -0.00 1	0,90	0.0003	0.0005	0.008
5/8	0,25	WHVZ5/8	119	0.027 - 0.062	-0.0005/ -0.00 1	1,30	0.0003	0.0005	0.008
3/4	0,438	WHVZ3/4	119	0.043 - 0.062	-0.0005/ -0.00 1	1,48	0.0004	0.0005	0.008
1	0,61	WHVZ 1	237	0.047 - 0.070	-0.0005/ -0.00 1	2,5	0.0004	0.0005	0.004
1 1/4	0,72	WHVZ1 1/4	237	0.062 - 0.078	-0.0005/ -0.00 1	4,15	0.0004	0.0005	0.004
1 1/2	0,89	WHVZ1 1/2	237	0.078 - 0.098	-0.0006/ -0.00 11	5,8	0.0004	0.0006	0.004
2	1,25	WHVZ2	237	0.094 - 0.118	-0.0006/ -0.00 13	9,69	0.0004	0.0006	0.004
2 1/2	1,75	WHVZ2 1/2	237	0.098 - 0.118	-0.0007/ -0.00 15	12,67	0.0005	0.0006	0.004
3	2	WHVZ 3	237	0.098 - 0.118	-0.0008/ -0.00 17	19,88	0.0005	0.0006	0.004

- Special tolerances and diameters are available upon request.
- Chrome layer tickness: 5 - 12 μm (0,0002 - 0,00047 inch).
- Chrome layer hardness: 900 - 1100 Hv 0,1.
- Length tolerance: +200 / -0 mm.



Series WP - WPZ

Deep case round shafts for ball screw
(50CrV4 - 50 CrMo 4 - Ck 55 - 100 Cr6)

Shaft diameter d mm	Shaft designation	Standard length mm	Hardening depth R _{ht} (max) mm	Tolerance ISO h7 μm	Weight kg/m	Straightness t3 mm/m
20	WP 20	6000	4	0 - 21	2,47	0,3
22	WP 22	6000	4	0 - 21	2,98	0,3
25	WP 25	6000	4	0 - 21	3,85	0,3
28	WP 28	6000	5	0 - 21	4,83	0,3
30	WP 30	6000	5	0 - 21	5,55	0,3
32	WP 32	6000	6	0 - 25	6,31	0,3
35	WP 35	6000	6	0 - 25	7,55	0,3
40	WP 40	6000	6	0 - 25	9,80	0,3
45	WP 45	6000	6	0 - 25	12,50	0,3
50	WP 50	6000	6	0 - 25	15,40	0,3
55	WP 55	6000	6	0 - 30	18,64	0,3
60	WP 60	6000	6.5	0 - 30	22,20	0,3
70	WP 70	6000	6.5	0 - 30	30,20	0,3
75	WP 75	6000	6.5	0 - 30	34,70	0,3
80	WP 80	6000	6.5	0 - 30	39,50	0,3

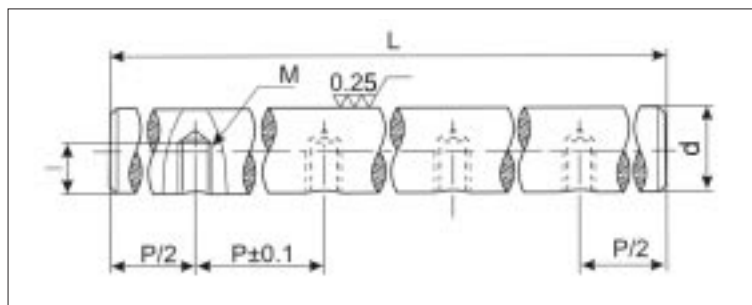
- Length tolerance: +200 / -0 mm
- Max available length 8200 mm upon request.

Shaft diameter d inch	Weight Kg/m	Shaft designation	Standard length inch	Hardening depth R _{ht} DIN 6773 inch	Tolerance class "L" inch	Straightness t3 inch/m
3/4	2,24	WPZ 3/4	237	0.079 - 0.157	-0.0005/-0.001	0,004
1	3,97	WPZ 1	237	0.079 - 0.157	-0.0005/-0.001	0,004
1 1/4	6,22	WPZ 1 1/4	237	0.079 - 0.236	-0.0005/-0.001	0,004
1 1/2	8,95	WPZ 1 1/2	237	0.079 - 0.236	-0.0006/-0.0011	0,004
2	15,91	WPZ 2	237	0.079 - 0.236	-0.0006/-0.0013	0,004
2 1/2	24,85	WPZ 2 1/2	237	0.079 - 0.255	-0.0007/-0.0015	0,004
3	35,78	WPZ 3	237	0.079 - 0.255	-0.0008/-0.0017	0,004

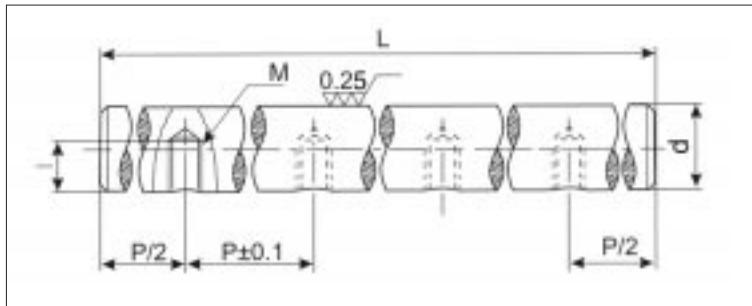
- Length tolerance: +200 / -0 mm
- Max available length 322 inch upon request.

Series WB

Hardened and ground shafts,
predrilled and tapped fixing bores.



Shaft diameter d mm	Shaft designation	Pitch P mm	P/2 mm	Nominal screw size	Thread depth l mm	Standard length L mm	N° of holes for standard length
10	WB10A	75	37,5	M4	6	6000	79
10	WB10B	120	60	M4	6	6000	49
10	WB10C	150	75	M4	6	6000	39
12	WB12A	75	37,5	M4	8	6000	79
12	WB12B	120	60	M4	8	6000	49
12	WB12C	150	75	M4	8	6000	39
14	WB14A	75	37,5	M4	8	6000	79
14	WB14B	120	60	M4	8	6000	49
14	WB14C	150	75	M4	8	6000	39
16	WB16A	75	37,5	M5	9	6000	79
16	WB16B	100	50	M5	9	6000	59
16	WB16C	150	75	M5	9	6000	39
16	WB16D	150	75	M4	9	6000	39
20	WB20A	50	25	M6	11	6000	119
20	WB20B	75	37,5	M6	11	6000	79
20	WB20C	100	50	M6	11	6000	59
20	WB20D	150	75	M6	11	6000	39
20	WB20E	150	75	M5	11	6000	39
25	WB25A	60	30	M8	15	6000	99
25	WB25B	75	37,5	M8	15	6000	79
25	WB25C	120	60	M6	15	6000	49
25	WB25D	120	60	M8	15	6000	49
25	WB25E	150	75	M6	15	6000	39
25	WB25F	200	100	M6	15	6000	29
30	WB30A	60	30	M10	17	6000	99
30	WB30B	75	37,5	M10	17	6000	79
30	WB30C	100	50	M10	17	6000	59
30	WB30D	150	75	M6	15	6000	39
30	WB30E	150	75	M8	15	6000	39
30	WB30F	150	75	M10	15	6000	39
30	WB30G	200	100	M8	15	6000	29



Series WB

Hardened and ground shafts,
predrilled and tapped fixing bores.

Shaft diameter d mm	Shaft designation	Pitch P mm	P/2 mm	Nominal screw size	Thread depth l mm	Standard length L mm	N° of holes for standard length
40	WB40A	75	37,5	M12	21	6000	79
40	WB40B	100	50	M12	21	6000	59
40	WB40C	150	75	M10	19	6000	39
40	WB40D	150	75	M8	21	6000	39
40	WB40E	200	100	M10	19	6000	29
40	WB40F	200	100	M8	17	6000	29
40	WB40G	300	150	M8	17	6000	19
50	WB50A	100	50	M16	27	6000	59
50	WB50B	100	50	M14	25	6000	59
50	WB50C	150	75	M10	22	6000	39
50	WB50D	150	75	M10	21	6000	39
50	WB50E	200	100	M10	21	6000	29
50	WB50F	200	100	M12	21	6000	29
50	WB50G	300	150	M12	21	6000	19
50	WB50H	300	150	M10	21	6000	19
60	WB60A	100	50	M16	27	6000	59
60	WB60B	100	50	M14	25	6000	59
60	WB60C	150	75	M10	22	6000	39
60	WB60D	150	75	M10	21	6000	39
60	WB60E	200	100	M10	21	6000	29
60	WB60F	200	100	M12	21	6000	29
60	WB60G	300	150	M12	21	6000	19
60	WB60H	300	150	M10	21	6000	19
60	WB60I	300	150	M20	21	6000	19
80	WB80A	100	50	M16	27	6000	59
80	WB80B	100	50	M14	25	6000	59
80	WB80F	200	100	M12	21	6000	29
80	WB80G	300	150	M12	21	6000	19
80	WB80I	300	150	M20	21	6000	19
80	WB80J	300	150	M22	21	6000	19

- These shafts are stocked predilled and tapped. They are suitable for assembly with standard support rails.
- Length other than shown in the tables can be obtained by cutting the stock length.
- Predrilled shafts are available for every series upon request.


Shaft diameter tolerances

Diameter Classification mm		f6 μm		f7 μm		g6 μm		h5 μm		h6 μm		h7 μm		h8 μm	
Greater than	Up to	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
3	6	-10	-18	-10	-22	-4	-12	0	-5	0	-8	0	-12	0	-18
6	10	-13	-22	-13	-28	-5	-14	0	-6	0	-9	0	-15	0	-22
10	14	-16	-27	-16	-34	-6	-17	0	-8	0	-11	0	-18	0	-27
14	18														
18	24	-20	-33	-20	-41	-7	-20	0	-9	0	-13	0	-21	0	-33
24	30														
30	40	-25	-41	-25	-50	-9	-25	0	-11	0	-16	0	-25	0	-39
40	50														
50	65	-30	-49	-30	-60	-10	-29	0	-13	0	-19	0	-30	0	-46
65	80														
80	100	-36	-58	-36	-71	-12	-34	0	-15	0	-22	0	-35	0	-54
100	120														
120	140	-43	-68	-43	-83	-14	-39	0	-18	0	-25	0	-40	0	-63
140	160														



Shaft diameter tolerances

h9 μm		h10 μm		j6 μm		k5 μm		k6 μm		m5 μm		m6 μm		n5 μm		n6 μm	
Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	Lower
0	-30	0	-48	+6	-2	+6	+1	+9	+1	+9	+4	+12	+4	+13	+8	+16	+8
0	-36	0	-58	+7	-2	+7	+1	+10	+1	+12	+6	+15	+6	+16	+10	+19	+10
0	-43	0	-70	+8	-3	+9	+1	+12	+1	+15	+7	+18	+7	+20	+12	+23	+12
0	-52	0	-84	+9	-4	+11	+2	+15	+2	+17	+8	+21	+8	+24	+15	+28	+15
0	-62	0	-10	+11	-5	+13	+2	+18	+2	+20	+9	+25	+9	+28	+17	+33	+17
0	-74	0	-120	+12	-7	+15	+2	+21	+2	+24	+11	+30	+11	+33	+20	+39	+20
0	-87	0	-140	+13	-9	+18	+3	+25	+3	+28	+13	+35	+13	+38	+23	+45	+23
0	-100	0	-160	+14	-11	+21	+3	+28	+3	+33	+15	+40	+15	+45	+27	+52	+27

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