

Linear Shafts

- | | |
|--|---|
|  A-Line W |  A-Line WRA |
|  A-Line WZ |  A-Line WRAZ |
|  A-Line WV |  A-Line WRB |
|  A-Line WVZ |  A-Line WRBZ |
| A-Line WH |  A-Line WRBV |
| A-Line WHV | |



A-LINE – Precision Hard Ground Shafts

ASO Hydraulics & Pneumatics precision shafts are induction hardened shafts according to the steel quality, diameter and hardness depth needed.

A-LINE products are manufactured from steels having the following properties:

Steel grade correspondents

ASO GROUP	EN	DIN	BS	W	AFNOR	ASTM
A-LINE W						
A-LINE WZ	C53	Cf53	070MS	1.1213	XC48TS	1024
A-LINE WV						
A-LINE WVZ						
A-LINE WH	C60	C60	60HS	1.0601	1C60	1060
A-LINE WHZ						
A-LINE WRA	X90CrMoV18	X90CrMoV18	–	1.4112	–	440B
A-LINE WRAZ						
A-LINE WRB	X46Cr13	X46Cr13	–	1.4034	Z44Cr13	420C
A-LINE WRBZ						
A-LINE WRBZ						

Table 1: Corresponding standards for the steel used

Chemical Composition

Steel grade	C	Si	Mn	Pmax	Smax	Cr	Ni	Mo	V
Cf53	0.50-0.57	0.15-0.35	0.40-0.70	0.025	0.035	–	–	–	–
C60	0.57-0.65	max 0.40	0.60-0.90	0.030	0.035	max 0.40	max 0.40	max 0.10	–
X90CrMoV18	0.85-0.95	max 1.0	max 1.0	0.040	0.015	17.0-19.0	–	0.9-1.3	0.07-0.12
X46Cr13	0.42-0.50	max 1.0	max 1.0	0.045	0.030	12.5-14.4	–	–	–

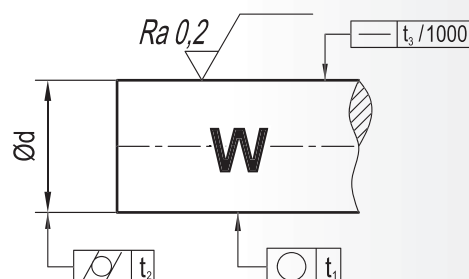
Table 2: Chemical composition in % by weight

Mechanical Properties

Product	Steel grade	Diameter/ Nominal Thickness	Tensile Strength	Yield Point	Elongation	Hardness Brinell	
		Ø [mm]/ s [mm]	Rm [N/mm²]	Rp _{0.2} [N/mm²]	A5 [%]	HB	
A-LINE W	Cf53	Ø < 18*	700-850	min. 475	min. 10	223	
A-LINE WZ		18 < Ø <100**	610-760	min. 340	min.16		
A-LINE WV		Ø > 100**	min. 560	min. 275	min.16		
A-LINE WVZ							
A-LINE WH	C60	s<16	min 720	min. 390	min. 11	241	
A-LINE WHZ		16 < s < 40	min 700	min. 350	min.12		
		40 < s < 80	min. 670	min. 240	min.12		
A-LINE WRA	X90CrMoV18	Ø < 60	–	–	–	max. 265	
A-LINE WRAZ							
A-LINE WRB	X46Cr13	Ø < 60	max. 800	–	–	max. 245	
A-LINE WRBZ							
A-LINE WRBV							

Table 3: Mechanical Properties for the steels used





Dimensional Properties:

Shaft Diameter** d	Weight per meter	Shaft part number	Standard length	Hardening depth SHD DIN 15787	Standard tolerance ISO h6	Roundness (circular) t1	Parallelism (cylindric) t2	Straightness t3
[mm]	[kg]		[mm]	[mm]	[µm]	[µm]	[µm]	[mm/m]
4	0.10	W 4	4000	0.5 - 0.8	0/-8	4	6	0.16
5	0.16	W 5	6000	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	0.40	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	2.00	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	1.5 - 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	12.50	W 45	6000	1.6 - 2.0	0/-16	7	11	0.1
50	15.40	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	22.20	W 60	7000	2.2 - 2.6	0/-19	8	13	0.1
65	26.03	W 65	7000	2.2 - 2.6	0/-19	8	13	0.1
70	30.20	W 70	7000	2.2 - 2.6	0/-19	8	13	0.1
75	34.70	W 75	7000	2.2 - 2.6	0/-19	8	13	0.1
80	39.50	W 80	7000	2.2 - 2.6	0/-19	8	13	0.1
90	49.92	W 90	7000	2.2 - 3.2	0/-22	9	13	0.2
100	61.62	W 100	7000	2.2 - 3.2	0/-22	9	13	0.2
120	88.73	W 120	7000	2.5 - 4.0	0/-22	10	16	0.2

*Other diameters, lengths/cut lengths can be provided at premium price / **Some diameters may be subject to a minimum quantity requested

Properties

Surface Hardness Cf53:
62±2HRC

Surface Roughness
Ra = max. 0.20 [µm]

Length tolerance:
0/+200 [mm]

Diameter tolerance

Standard ISO-h6

*Special Tolerance can be provided at premium price

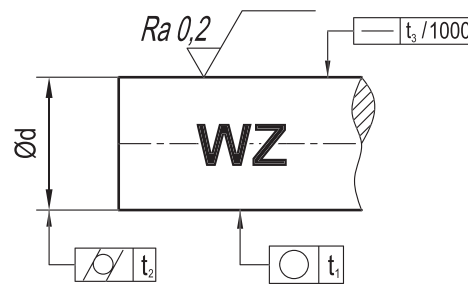
Packaging

Linear shafts are degreased and oiled, placed in bundles that are wrapped in wax paper and raffia

Extra protection with additional cost– wooden boxes

Marking

For full traceability, each batch has a label that contains info about: manufacturing date, product name, diameter, tolerance range, number of linear shafts, heat no.



Dimensional Properties:

Shaft Diameter	Shaft Diameter d**	Weight per meter	Shaft part number	Standard length	Hardening depth SHD DIN 15787	Standard tolerance Class "L"	Roundness (circular) t1	Parallelism (cylindrical) t2	Straightness t3
[in]	[mm]	[kg]		[in]	[mm]	[in]	[in]	[in]	[in/m]
1/4	6.35	0.25	WZ 6	237	0.019-0.031	-0.0005/-0.001	0.0002	0.0002	0.008
3/8	9.525	0.56	WZ 9	237	0.027-0.039	-0.0005/-0.001	0.0002	0.0002	0.008
1/2	12.7	0.99	WZ 12	237	0.031-0.047	-0.0005/-0.001	0.0002	0.0003	0.008
5/8	15.875	1.55	WZ 15	237	0.043-0.059	-0.0005/-0.001	0.0002	0.0003	0.008
3/4	19.05	2.24	WZ 19	237	0.047-0.059	-0.0005/-0.001	0.0002	0.0004	0.008
1	25.4	3.97	WZ 25	237	0.059-0.066	-0.0005/-0.001	0.0002	0.0004	0.008
1 ¼	31.75	6.22	WZ 31	237	0.059-0.074	-0.0005/-0.001	0.0003	0.0004	0.004
1 ½	38.1	8.95	WZ 38	237	0.062-0.078	-0.0006/-0.0011	0.0003	0.0004	0.004
2	50.8	15.91	WZ 50	237	0.086-0.102	-0.0006/-0.0013	0.0003	0.0004	0.004
2 ¼	57.15	20.13	WZ 57	237	0.086-0.102	-0.0007/-0.0015	0.0003	0.0005	0.004
2 ½	63.5	24.85	WZ 63	276	0.086-0.102	-0.0007/-0.0015	0.0003	0.0005	0.004
3	76.2	35.78	WZ 76	276	0.086-0.102	-0.0008/-0.0017	0.0003	0.0005	0.004

*Other diameters, lengths/cut lengths can be provided at premium price / **Some diameters may be subject to a minimum quantity requested

Properties

Surface Hardness Cf53:
62±2HRC

Surface Roughness
Ra = max. 0.20 [µm]

Length tolerance:
0/+8 [in] (0/+200 [mm])

Diameter tolerance
Standard Class "L"

*Special Tolerance can be provided at premium price

Packaging

Linear shafts are degreased and oiled, placed in bundles that are wrapped in wax paper and raffia

Extra protection with additional cost – wooden boxes

Marking

For full traceability, each batch has a label that contains info about: manufacturing date, product name, diameter, tolerance range, number of linear shafts, heat no.



ALINE

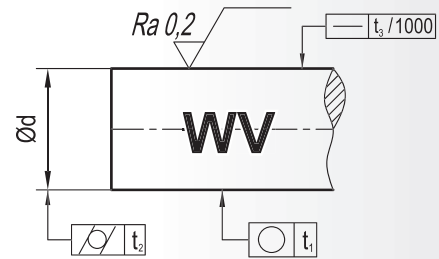
WV

Certifications / ISO 9001 / ISO 14001 / OHSAS 18001

Steelgrade / CF53

Rod end will
be printed
in green

/ Chromed Induction Hardened and ground steel shafts



Dimensional Properties:

Shaft Diameter** d	Weight per meter	Shaft part number	Standard length	Hardening depth SHD DIN 15787	Standard tolerance ISO h7	Roundness (circular) t1	Parallelism (cylindric) t2	Straightness t3
[mm]	[kg]		[mm]	[mm]	[µm]	[µm]	[µm]	[mm/m]
4	0.10	WV 4	4000	0.5-0.8	0/-12	6	10	0.16
5	0.16	WV 5	6000	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	0.40	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
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	2.00	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	11	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	12.50	WV 45	6000	1.6-2.0	0/-25	11	15	0.1
50	15.40	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	22.20	WV 60	7000	2.2-2.6	0/-30	12	15	0.1
65	26.03	WV 65	7000	2.2-2.6	0/-30	12	15	0.1
70	30.20	WV 70	7000	2.2-2.6	0/-30	12	15	0.1
75	34.70	WV 75	7000	2.2-2.6	0/-30	12	15	0.1
80	39.50	WV 80	7000	2.2-2.6	0/-30	12	15	0.1
90	49.92	WV 90	7000	2.2-3.2	0/-35	14	17	0.2
100	61.62	WV 100	7000	2.2-3.2	0/-35	14	17	0.2
120	88.73	WV 120	7000	2.5-4.0	0/-35	14	17	0.2

*Other diameters, lengths/cut lengths can be provided at premium price / **Some diameters may be subject to a minimum quantity requested

***Lengths may vary depending on the Chroming process used

Properties

Chrome Layer: min. 10 [µm], usually 15 [µm]**Chrome Layer Hardness:** 900 HV 0.1 min.

*Special chroming layer at premium price

Surface Hardness Cf53: 62±2HRC**Surface Roughness:** Ra = max. 0.20 [µm]**Length tolerance:** 0/+200 [mm]**Diameter tolerance**

Standard ISO-h7

*Special Tolerance can be provided at premium price

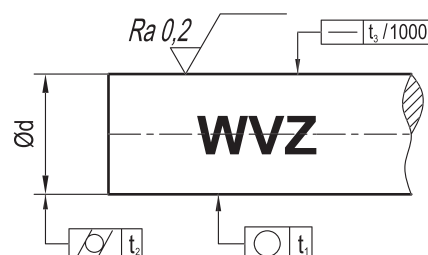
Packaging

Chromed Linear shafts supplied in 3 different packaging options:

Standard – plastic sleeves or paper tubes.**Special requirements with additional cost** – Seaworthy protected – aluminum foil or vacuum bags.**Extra protection with additional cost** – wooden boxes

Marking

For a full traceability each bar is marked individually on the plastic/paper tube with info about the date, product series, diameter, tolerance, resistance at saltwater spray test, heat no, production order and so on. The batch has a label with information regarding: Order no, Item no, Heat no., Steel Grade; total length of the batch, Weight, no of pieces in the batch.



Dimensional Properties:

Shaft Diameter** d	Shaft Diameter** d	Weight per meter	Shaft part number	Standard length	Hardening depth SHD DIN 15787	Standard Tolerance ISO h7	Roundness (circular) t1	Parallelism (cylindrical) t2	Straightness t3
[in]	[mm]	[kg]		[in]	[in]	[in]	[in]	[in]	[in/m]
1/4	6.35	0.25	WVZ 6	237	0.019-0.031	0/-0.000591	0.0002	0.0004	0.008
3/8	9.525	0.56	WVZ 9	237	0.027-0.039	0/-0.000591	0.0002	0.0004	0.008
1/2	12.7	0.99	WVZ 12	237	0.031-0.047	0/-0.000709	0.0003	0.0005	0.008
5/8	15.875	1.55	WVZ 15	237	0.043-0.059	0/-0.000709	0.0004	0.0005	0.008
3/4	19.05	2.24	WVZ 19	237	0.047-0.059	0/-0.000827	0.0004	0.0005	0.004
1	25.4	3.97	WVZ 25	237	0.059-0.066	0/-0.000827	0.0004	0.0005	0.004
1 ¼	31.75	6.22	WVZ 31	237	0.059-0.074	0/-0.000984	0.0004	0.0006	0.004
1 ½	38.1	8.95	WVZ 38	237	0.062-0.078	0/-0.000984	0.0004	0.0006	0.004
2	50.8	15.91	WVZ 50	237	0.086-0.102	0/-0.001181	0.0004	0.0006	0.004
2 ¼	57.15	20.13	WVZ 57	237	0.086-0.102	0/-0.001181	0.0005	0.0006	0.004
2 ½	63.5	24.85	WVZ 63	276	0.086-0.102	0/-0.001181	0.0005	0.0006	0.004
3	76.2	35.78	WVZ 76	276	0.086-0.102	0/-0.001181	0.0005	0.0006	0.004

*Lengths may vary depending on the Chroming process used

**Some diameters may be subject to a minimum quantity requested

***Other diameters, lengths/cut lengths can be provided at premium price

Properties

Chrome Layer: min. 10 [µm], usually 15 [µm]

Chrome Layer Hardness: 900 HV 0.1 min.

*Special chroming layer at premium price

Surface Hardness Cf53: 62±2HRC

Surface Roughness: Ra = max. 0.20 [µm]

Length tolerance: 0/+8 [in] (0/+200 [mm])

Diameter tolerance

Standard ISO-h7

*Special Tolerance can be provided at premium price including Class L

Packaging

Chromed Linear shafts supplied in 3 different packaging options:

Standard – plastic sleeves or paper tubes.

Special requirements with additional cost – Seaworthy protected – aluminum foil or vacuum bags.

Extra protection with additional cost – wooden boxes

Marking

For a full traceability each bar is marked individually on the plastic/paper tube with info about the date, product series, diameter, tolerance, resistance at saltwater spray test, heat no., production order and so on. The batch has a label with information regarding: Order no, Item no, Heat no., Steel Grade; total length of the batch, Weight, no of pieces in the batch.



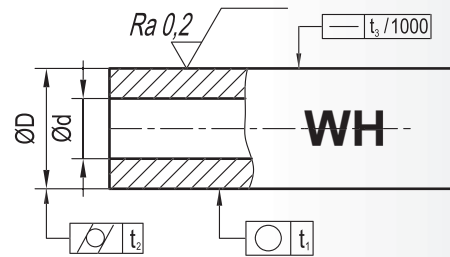
ALINE

WH

Certifications / ISO 9001 / ISO 14001 / OHSAS 18001

Steelgrade / C60

/ Induction Hardened and ground hollow shaft

**Dimensional Properties:**

Out Dia. ØD	Inner Dia. Ød	Weight per meter	Shaft part number	Standard length	Hardening depth SHD DIN 15787	Standard Tolerance ISO h6	Roundness (circular) t1	Parallelism (cylindrical) t2	Straightness t3
[mm]	[mm]	[kg]		[mm]	[mm]	[µm]	[µm]	[µm]	[mm/m]
12	4.0	0.79	WH 12	6000	0.6-1.3	0/-11	5	8	0.12
14	7.0	0.91	WH 14	6000	0.6-1.3	0/-11	5	8	0.12
16	7.0	1.28	WH 16	6000	0.6-1.6	0/-11	5	8	0.12
20	14.0	1.25	WH 20	6000	0.9-1.6	0/-13	6	9	0.1
25	15.6	2.35	WH 25	6000	0.9-1.8	0/-13	6	9	0.1
30	18.3	3.50	WH 30	6000	0.9-2.0	0/-13	6	9	0.1
40	28.0	4.99	WH 40	6000	1.5-2.5	0/-16	7	11	0.1
50	29.7	9.91	WH 50	6000	1.5-3.0	0/-16	7	11	0.1
60	36.0	14.20	WH 60	6000	2.2-3.0	0/-19	8	13	0.1

*Other diameters, lengths/cut lengths can be provided at premium price

**Some diameters may be subject to a minimum quantity requested

Properties**Surface Roughness :** Ra = max. 0.20 [µm]**Surface Hardness C60:** 62±2HRC**Length tolerance:** 0/+200 [mm]**Diameter tolerance**

Standard ISO-h6

*Special Tolerance can be provided at premium price

Packaging

Tube Linear shafts are degreased (OD and ID), oiled OD, placed in bundles that are wrapped in wax paper and raffia.

Special requirements with additional cost – Seaworthy protected – aluminum foil or vacuum bags.**Extra protection with additional cost** – wooden boxes**Marking**

For full traceability, each batch has a label that contains info about: manufacturing date, product name, diameter, tolerance range, number of linear shafts, heat no.



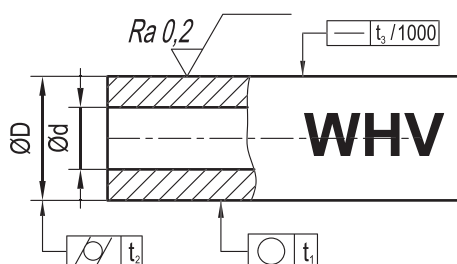
ALINE

WHV

Certifications / ISO 9001 / ISO 14001 / OHSAS 18001

Steel grade / C60

/ Chrome Plated - Induction Hardened and ground hollow shaft

**Dimensional Properties:**

Out Dia. ØD	Inner Dia. Ød	Weight per meter	Shaft part number	Standard length	Hardening depth SHD DIN 15787	Standard Tolerance ISO h7	Roundness (circular) t1	Parallelism (cylindrical) t2	Straightness t3
[mm]	[mm]	[kg]		[mm]	[mm]	[µm]	[µm]	[µm]	[mm/m]
12	4.0	0.79	WHV 12	6000	0.6-1.3	0/-18	8	12	0.12
14	7.0	0.91	WHV 14	6000	0.6-1.3	0/-18	8	12	0.12
16	7.0	1.28	WHV 16	6000	0.6-1.6	0/-18	8	12	0.12
20	14.0	1.25	WHV 20	6000	0.9-1.6	0/-21	9	12	0.1
25	15.6	2.35	WHV 25	6000	0.9-1.8	0/-21	9	12	0.1
30	18.3	3.50	WHV 30	6000	0.9-2.0	0/-21	9	12	0.1
40	28.0	4.99	WHV 40	6000	1.5-2.5	0/-25	11	15	0.1
50	29.7	9.91	WHV 50	6000	1.5-3.0	0/-25	11	15	0.1
60	36.0	14.20	WHV 60	6000	2.2-3.0	0/-30	12	15	0.1

*Lengths may vary depending on the Chroming process used

**Some diameters may be subject to a minimum quantity requested

***Other diameters, lengths/cut lengths can be provided at premium price

Properties**Chrome Layer:** min 10 [µm], usually 15 [µm]**Chrome Layer Hardness:** 900 HV 0.1 min

*Special chroming layer at premium price

Surface Hardness C60: 62±2HRC**Surface Roughness:** Ra = max 0.20 [µm]**Diameter tolerance**

Standard ISO-h7

*Special Tolerance can be provided at premium price

Packaging

Chromed Linear shafts supplied in 3 different packaging options:

Standard – plastic sleeves or paper tubes**Special requirements with additional cost** – Seaworthy protected – aluminum foil or vacuum bags.**Extra protection with additional cost** – wooden boxes**Marking**

For a full traceability each bar is marked individually on the plastic/paper tube with info about the date, product series, diameter, tolerance, resistance at saltwater spray test, heat no, production order and so on. The batch has a label with information regarding: Order no, Item no, Heat no., Steel Grade; total length of the batch, Weight, no of pieces in the batch.



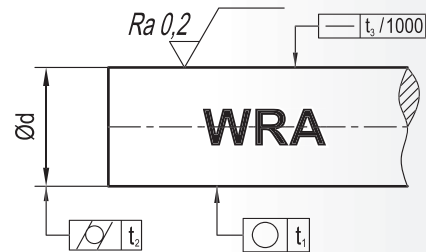
ALINE

WRA

Induction Hardened and ground Stainless Steel shafts

Certifications / ISO 9001 / ISO 14001 / OHSAS 18001

Steelgrade / X90CrMoV18

Rod end will
be printed
in black
with a white line

Dimensional Properties:

Shaft Diameter d	Weight per meter	Shaft part number	Standard length	Hardening depth SHD DIN 15787	Standard tolerance ISO h6	Roundness (circular) t1	Parallelism (cylindric) t2	Straightness t3
[mm]	[kg]		[mm]	[mm]	[µm]	[µm]	[µm]	[mm/m]
5	0.16	WRA 5	5000	0.5-0.8	0/-8	4	5	0.16
6	0.23	WRA 6	6000	0.5-0.8	0/-8	4	6	0.16
8	0.40	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	1.2-1.5	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	6000	1.6-2.0	0/-16	7	11	0.1
50	15.40	WRA 50	6000	2.2-2.6	0/-16	7	11	0.1
60	22.20	WRA 60	6000	2.9-3.3	0/-19	8	13	0.1

*Other diameters, lengths/cut lengths can be provided at premium price

**Some diameters may be subject to a minimum quantity requested

Properties

Surface Hardness X90CrMoV18: 56±3HRC

Surface Roughness : Ra = max 0.20 [µm]

Length tolerance: 0/+200 [mm]

Diameter tolerance

Standard ISO-h6

*Special Tolerance can be provided at premium price

Packaging

Linear shafts are degreased and oiled, placed in bundles that are wrapped in wax paper and raffia

Extra protection with additional cost – wooden boxes

Marking

For full traceability, each batch has a label that contains info about: manufacturing date, product name, diameter, tolerance range, number of linear shafts, heat no.

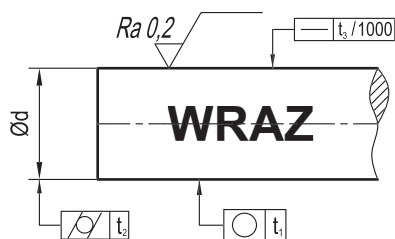


ALINE

WRAZ

Induction Hardened and ground Stainless Steel shafts

Certifications / ISO 9001 / ISO 14001 / OHSAS 18001

Imperial Steel grade / ASTM - 440B
or EN - X90CrMoV18Rod end
will be
printed
in black
with a white cross

Dimensional Properties:

Shaft Diameter	Shaft Diameter d**	Weight per meter	Shaft part number	Standard length	Hardening depth SHD DIN 15787	Standard tolerance Class "L"	Roundness (circular) t1	Parallelism (cylindrical) t2	Straightness t3
[in]	[mm]	[kg]		[in]	[mm]	[in]	[in]	[in]	[in/m]
1/4	6.35	0.25	WRAZ 6	237	0.019-0.031	-0.0005/-0.001	0.0002	0.0002	0.008
3/8	9.525	0.56	WRAZ 9	237	0.027-0.039	-0.0005/-0.001	0.0002	0.0002	0.008
1/2	12.7	0.99	WRAZ 12	237	0.031-0.047	-0.0005/-0.001	0.0002	0.0003	0.008
5/8	15.875	1.55	WRAZ 15	237	0.043-0.059	-0.0005/-0.001	0.0002	0.0003	0.008
3/4	19.05	2.24	WRAZ 19	237	0.047-0.059	-0.0005/-0.001	0.0002	0.0004	0.004
1	25.4	3.97	WRAZ 25	237	0.059-0.066	-0.0005/-0.001	0.0002	0.0004	0.004
1 1/4	31.75	6.22	WRAZ 31	237	0.059-0.074	-0.0005/-0.001	0.0002	0.0004	0.004
1 1/2	38.1	8.95	WRAZ 38	237	0.094-0.114	-0.0006/-0.0011	0.0003	0.0004	0.004
2	50.8	15.91	WRAZ 50	237	0.106-0.125	-0.0006/-0.0013	0.0003	0.0005	0.004
2 1/4	57.15	20.13	WRAZ 57	237	0.114-0.129	-0.0007/-0.0015	0.0003	0.0005	0.004

*Other diameters, lengths/cut lengths can be provided at premium price

**Some diameters may be subject to a minimum quantity requested

Properties

Surface Hardness X90CrMoV18:

56±3HRC

Surface Roughness

Ra = max 0.20 [µm]

Length tolerance:

0/+8 [in] (0/+200 [mm])

Diameter tolerance

Standard Class "L"

*Special Tolerance can be provided at premium price

Packaging

Linear shafts are degreased and oiled, placed in bundles that are wrapped in wax paper and raffia

Extra protection with additional cost – wooden boxes

Marking

For full traceability, each batch has a label that contains info about: manufacturing date, product name, diameter, tolerance range, number of linear shafts, heat no.



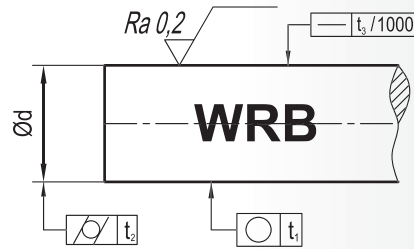
ALINE

WRB

Induction Hardened and ground Stainless Steel shafts

Certifications / ISO 9001 / ISO 14001 / OHSAS 18001

Steelgrade / X46Cr13

Rod end will
be printed
in white
with a black line

Dimensional Properties:

Shaft Diameter d	Weight per meter	Shaft part number	Standard length	Hardening depth SHD DIN 15787	Standard tolerance ISO h6	Roundness (circular) t1	Parallelism (cylindric) t2	Straightness t3
[mm]	[kg]		[mm]	[mm]	[µm]	[µm]	[µm]	[mm/m]
5	0.16	WRB 5	6000	0.5-0.8	0/-8	4	5	0.16
6	0.23	WRB 6	6000	0.5-0.8	0/-8	4	6	0.16
8	0.40	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	1.1-1.5	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	1.6-2.0	0/-16	7	11	0.1
50	15.40	WRB 50	6000	2.2-2.6	0/-16	7	11	0.1
60	22.20	WRB 60	6000	2.9-3.3	0/-19	8	13	0.1

*Other diameters, lengths/cut lengths can be provided at premium price

**Some diameters may be subject to a minimum quantity requested

Properties

Surface Hardness X46Cr13: 55±3HRC

Surface Roughness : Ra = max 0.20 [µm]

Length tolerance: 0/+200 [mm]

Diameter tolerance

Standard ISO-h6

*Special Tolerance can be provided at premium price

Packaging

Linear shafts are degreased and oiled, placed in bundles that are wrapped in wax paper and raffia

Extra protection with additional cost – wooden boxes

Marking

For full traceability, each batch has a label that contains info about: manufacturing date, product name, diameter, tolerance range, number of linear shafts, heat no.



ALINE

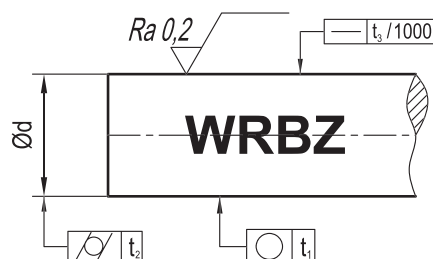
WRBZ

Induction Hardened and ground Stainless Steel shafts

Certifications / ISO 9001 / ISO 14001 / OHSAS 18001

Imperial Steel grade / ASTM - 420C or EN - X46Cr13

Rod end will
be printed
in white
with a black cross



Dimensional Properties:

Shaft Diameter	Shaft Diameter d**	Weight per meter	Shaft part number	Standard length	Hardening depth SHD DIN 15787	Standard tolerance Class "L"	Roundness (circular) t1	Parallelism (cylindrical) t2	Straightness t3
[in]	[mm]	[kg]		[in]	[mm]	[in]	[in]	[in]	[in/m]
1/4	6.35	0.25	WRBZ 6	237	0.019-0.031	-0.0005/-0.001	0.0002	0.0002	0.008
3/8	9.525	0.56	WRBZ 9	237	0.027-0.039	-0.0005/-0.001	0.0002	0.0002	0.008
1/2	12.7	0.99	WRBZ12	237	0.031-0.047	-0.0005/-0.001	0.0002	0.0003	0.008
5/8	15.875	1.55	WRBZ15	237	0.043-0.059	-0.0005/-0.001	0.0002	0.0003	0.008
3/4	19.05	2.24	WRBZ 19	237	0.047-0.059	-0.0005/-0.001	0.0002	0.0004	0.004
1	25.4	3.97	WRBZ 25	237	0.059-0.066	-0.0005/-0.001	0.0002	0.0004	0.004
1 1/4	31.75	6.22	WRBZ 31	237	0.059-0.074	-0.0005/-0.001	0.0002	0.0004	0.004
1 1/2	38.1	8.95	WRBZ 38	237	0.094-0.114	-0.0006/-0.0011	0.0003	0.0004	0.004
2	50.8	15.91	WRBZ 50	237	0.106-0.125	-0.0006/-0.0013	0.0003	0.0005	0.004
2 1/4	57.15	20.13	WRBZ 57	237	0.114-0.129	-0.0007/-0.0015	0.0003	0.0005	0.004

*Other diameters, lengths/cut lengths can be provided at premium price

**Some diameters may be subject to a minimum quantity requested

Properties

Surface Hardness X46Cr13:

55±3HRC

Surface Roughness

Ra = max 0.20 [µm]

Length tolerance:

0/+8 [in] (0/+200 [mm])

Diameter tolerance

Standard Class "L"

*Special Tolerance can be provided at premium price

Packaging

Linear shafts are degreased and oiled, placed in bundles that are wrapped in wax paper and raffia

Extra protection with additional cost– wooden boxes

Marking

For full traceability, each batch has a label that contains info about: manufacturing date, product name, diameter, tolerance range, number of linear shafts, heat no.



ALINE

WRBV

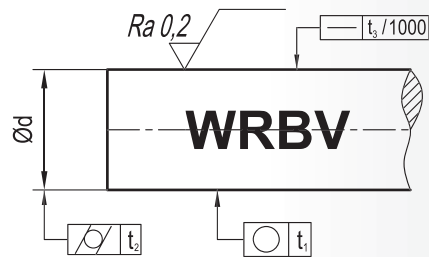
Certifications / ISO 9001 / ISO 14001 / OHSAS 18001

Steelgrade / X46Cr13

Rod end will
be printed
in green
with a yellow line



/ Chromed plated Induction Hardened and ground Stainless Steel shafts



Dimensional Properties:

Shaft Diameter d	Weight per meter	Shaft part number	Standard length	Hardening depth SHD DIN 15787	Standard tolerance ISO h7	Roundness (circular) t1	Parallelism (cylindric) t2	Straightness t3
[mm]	[kg]		[mm]	[mm]	[µm]	[µm]	[µm]	[mm/m]
5	0.16	WRBV 5	6000	0.5-0.8	0/-12	4	5	0.16
6	0.23	WRBV 6	6000	0.5-0.8	0/-12	4	6	0.16
8	0.40	WRBV 8	6000	0.6-0.9	0/-15	4	6	0.16
10	0.62	WRBV 10	6000	0.7-1.0	0/-15	4	6	0.16
12	0.89	WRBV 12	6000	0.8-1.2	0/-18	5	8	0.12
14	1.21	WRBV 14	6000	0.9-1.3	0/-18	5	8	0.12
15	1.39	WRBV 15	6000	1.1-1.5	0/-18	5	8	0.12
16	1.58	WRBV 16	6000	1.1-1.5	0/-18	5	8	0.12
20	2.47	WRBV 20	6000	1.2-1.5	0/-21	6	9	0.1
25	3.85	WRBV 25	6000	1.5-1.7	0/-21	6	9	0.1
30	5.55	WRBV 30	6000	1.5-1.9	0/-21	6	9	0.1
40	9.87	WRBV 40	6000	1.6-2.0	0/-25	7	11	0.1
50	15.40	WRBV 50	6000	2.2-2.6	0/-25	7	11	0.1
60	22.20	WRBV 60	6000	2.9-3.3	0/-30	8	13	0.1

*Other diameters, lengths/cut lengths can be provided at premium price

**Some diameters may be subject to a minimum quantity requested

***Special lengths/cut lengths can be provided at premium price

Properties

Chrome Layer: min 10 [µm], usually 15 [µm]**Chrome Layer Hardness:** 900 HV 0.1 min

*Special chroming layer at premium price

Surface Hardness X46Cr13: 55±3HRC**Surface Roughness:** Ra = max 0.20 [µm]**Length tolerance:** 0/+200 [mm]**Diameter tolerance**

Standard ISO-h7

*Special Tolerance can be provided at premium price

Packaging

Chromed Linear shafts supplied in 3 different packaging options:

Standard – plastic sleeves or paper tubes**Special requirements with additional cost** – Seaworthy protected – aluminum foil or vacuum bags.**Extra protection with additional cost** – wooden boxes

Marking

For a full traceability each bar is marked individually on the plastic/paper tube with info about the date, product series, diameter, tolerance, resistance at saltwater spray test, heat no., production order and so on. The batch has a label with information regarding: Order no, Item no, Heat no., Steel Grade; total length of the batch, Weight, no of pieces in the batch.