



HYDRAULIC STEEL TUBES

Literature



Introduction:

Chuan Kok maintains a large stock of hydraulic tubes in steel material. These steel tubes are in accordance with DIN 2391, the standard specification of steel tubes for precision application such as hydraulic and pneumatic power systems, and DIN 2445, the standard specification of seamless steel tubes for dynamic loads.

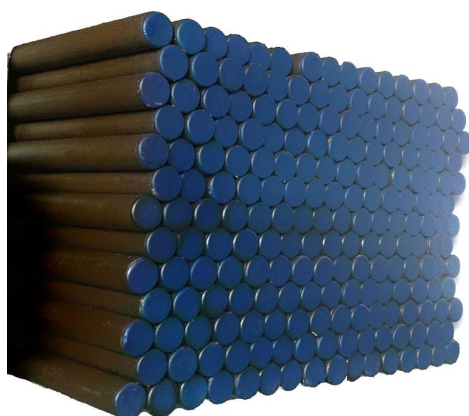


Figure 1 Hydraulic Steel Tubes

Steel tubes are available in two kinds of steel material, ST37.4 (E235N) and ST52.4 (E355N). Different materials result from differences in the working pressure that the material can withstand. Grade ST52.4 is a higher grade compared to grade ST37.4, and a higher grade of material quality can reduce wall thickness and weight while maintaining the same working pressure.

Steel Tube Attributes:

Different material grades will lead to differences in attributes. For ST37.4, tensile strength ranges from 340 N/mm² to 480 N/mm², while for ST52.4, the tensile strength ranges from 490 N/mm² to 630 N/mm². Higher tensile strength means higher working pressures with reduced wall thickness, thus leading to reduced tube weight.

The two different steel grades also lead to different yield strengths. The minimum yield strength for ST37.4 is 235 MPa and for ST52.4 it is 355 MPa. However, for steel tubes with an outside diameter that is less than 30MM and a thickness that is less than 3.0MM, the minimum yield strength is 10 MPa lower.

There are also differences in chemical composition between ST37.4 and ST52.4. For example, the maximum carbon content for ST37.4 is 0.17%, while the maximum carbon content for ST52.4, is 0.22%. The high carbon content will make the steel harder and stronger through heat treatment. However, it will also cause the steel material to be less ductile and reduce the melting point.

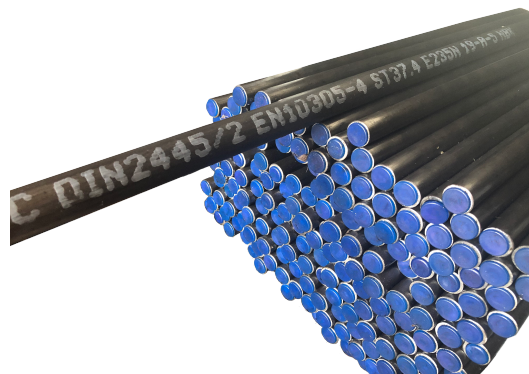


Figure 2 Hydraulic Steel Tubes Din 2445/2

Steel Tube Finishing:

The finishing of tubes under ST37.4 and ST52.4 are NBK, where tubes are normalized, phosphated, and oiled inside and outside. Normalizing is a type of heat treatment process. Heat treatment is done to change its mechanical properties such as hardness, yield strength, and ductility.

In the normalizing process, steel is heated to a temperature about 55°C. This process will be continued over a period of time for a transformation namely grain refinement to occur. The steel then will be air-cooled at room temperature. This results in the steel becoming stronger and harder.

Outer Diameter and Tube Thickness Specifications:

The specifications of the tube outer diameter and tube wall thickness are according to EN 10305-4. Below Hydraulic Steel Tubes Literature will show the preferred outside diameter, inside diameter, and wall thickness.

Hydraulic Tube (ST 37.4 NBK)

i) Outer Diameter (MM)

* Hydraulic tubes have a standard length of 6 meters long.

Outer Diameter (MM)	Wall Thickness (MM)	Working Pressure (Bar)	Burst Pressure (Bar)
4	1.0	707	1755
5	1.0	565	1404
6	1.0	471	1170
6	1.5	707	1755
8	1.0	353	878
8	1.5	530	1316
8	2.0	707	1755
8	2.5	883	2194
10	1.0	283	702
10	1.5	424	1053
10	2.0	565	1404
10	2.5	707	1755
12	1.0	236	585
12	1.2	283	702
12	1.5	353	878
12	2.0	471	1170
12	2.5	589	1463
14	1.5	303	752
14	2.0	404	1003
14	2.5	505	1254

14	3.0	606	1504
15	1.0	188	468
15	1.5	283	702
15	2.0	377	936
15	2.5	471	1170
15	3.0	565	1404
16	1.5	265	658
16	2.0	353	878
16	3.0	530	1316
18	1.5	236	585
18	2.0	314	780
18	3.0	471	1170
20	2.0	283	702
20	2.5	353	878
20	3.0	424	1053
20	3.5	495	1229
20	4.0	565	1404
20	4.5	636	1580
20	5.0	707	1755
22	2.0	257	638
22	2.5	321	798
22	3.0	385	957
22	4.0	514	1276
25	2.0	226	562
25	2.5	283	702
25	3.0	339	842
25	3.5	396	983
25	4.0	452	1123
25	5.0	565	1404

28	2.0	202	501
28	3.0	303	752
28	4.0	404	1003
28	5.0	505	1254
30	2.0	188	468
30	3.0	283	702
30	4.0	377	936
30	5.0	471	1170
35	3.0	242	602
35	4.0	323	802
35	5.0	404	1003
38	3.0	223	554
38	4.0	297	739
38	5.0	372	924
42	2.0	135	334
42	3.0	202	501
42	4.0	269	669
42	5.0	336	836
50	3.0	170	421
50	5.0	283	702
60	3.0	141	351
65	6.0	261	648
75	3.0	113	281

ii) Outer Diameter (Inches)

* Hydraulic tubes have a standard length of 6 meters long.

Outer Diameter (Inches)	Wall Thickness (MM)	Working Pressure (Bar)	Burst Pressure (Bar)
1/4"	1.2	534	1327
1/4"	1.5	668	1658
3/8"	1.22	362	899
3/8"	1.5	445	1105
1/2"	1.5	334	829
3/4"	2.0	297	737
3/4"	2.64	392	973
1"	3.0	334	829
1 1/4"	3.0	267	663
1 1/4"	3.25	289	719

iii) Nominal Bore (NB)

* Hydraulic tubes have a standard length of 6 meters long.

Nominal Bore (NB)	Wall Thickness (MM)	Working Pressure (Bar)	Burst Pressure (Bar)
1/8"	2.41	649	1611
1/4"	3.02	618	1536
3/8"	3.2	523	1298
1/2"	3.0	391	971
3/4"	3.0	312	774
1"	3.5	291	723
1"	4.55	378	939
1 1/4"	4.85	321	797
1 1/2"	5.08	295	734
2 1/2"	6.3	NIL	580

Hydraulic Tube (ST 52.4 NBK)

* Hydraulic tubes have a standard length of 6 meters long.

Outer Diameter (MM)	Wall Thickness (MM)	Working Pressure (Bar)	Burst Pressure (Bar)
10	2.0	799	1919
12	2.0	666	1599
15	2.0	533	1279
16	1.5	375	899
16	2.0	500	1199
18	1.5	333	800
18	2.0	444	1066
20	2.0	400	959
20	2.5	500	1199
20	3.0	599	1439
22	2.0	363	872
25	2.0	320	768
25	2.5	400	959
25	3.0	480	1151
25	4.0	639	1535
25	5.0	799	1919
28	2.0	285	685
28	3.0	428	1028
30	3.0	400	959
30	4.0	533	1279
35	3.0	343	822
35	4.0	457	1096
38	3.0	315	757
38	4.0	421	1010
38	5.0	526	1262

42	3.0	285	685
42	4.0	381	914
42	5.0	476	1142
45	5.0	444	1066
50	10.0	799	1919
50	5.0	400	959
50	6.0	480	1151
54	6.0	444	1066
60	5.0	333	800
60	6.0	400	959
65	8.0	492	1181
66	8.5	515	1236
76.1	6.3	331	794
80	10.0	500	1199
90	5.0	222	533
90	10.0	444	1066
97	12.0	494	1187
100	10.0	400	959
120	12.0	400	959
2"	6.0	472	829

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