QD(G) Multistage Centrifugal Pump



An Pump Machinery is the pump factory approved by ISO9001, ISO14001 and OHSAS18001. We also have the certificate of CE. Our factory is over 50,000 square meters with the professional engineer over 20. The Max casting parts weight we could do one time is 7 tons. And we have capacity to produce 600 tons per month and with the heat treatment furnace dimension 6mx5.5mx2.5m. The Max parts we could machine is 6.4 meters and we have capacity to assemble the pump over 1800mm and our cranes capacity is 30 tons.

产品用途 PRODUCT PURPOSE

QD (G)型泵是卧式多级离心泵，它适合于输送清水(含杂质量小于 1%，颗粒度小于 0.1mm)及物理化学性质类似于清水的其它液体。

QD (G)型中低压锅炉给水泵输送介质温度不大于105℃，适用于小型锅炉给水或输送类似于热水等场合。性能范围

流量：3.75- 185m3/h　　配套功率：4.0～400kW

扬程：69～684m　　进口直径：40～150mm

QD (G)型次高压锅炉给水泵输送介质温度不大于160℃，适用于小型锅炉给水或输送类似于热水等场合。性能范围

流量：15～300m3/h　　配套功率：75～1250kW

扬程：390～1050m　　进口直径：65～200mm

Model QD (G) pump is a horizontal multi-stage centrifugal pump and suitable for transporting pure water (with the contained foreign matters' content less than l % and graininess less than 0. 1mm) and other liquids of both physical and chemical natures similar to those of pure water.

QD (G) model middle and low pressure boiler water supply pump is applicable to transport medium with temperature of not higher than 105℃, and is also applicable for small boiler water supply or transporting medium similar to hot water.

Performance range of model QD (G) series

Flow : 3.75-1 8 5 m3/h　Corollary power: 4.0-400kW

Head:　69-684m　　Inlet diameter:　40-1 50mm

QD (G) model hypo-high-pressure boiler water supply pump is applicable to transport medium with temperature of not higher than 160℃, and is also applicable for small boiler water supply or transporting medium similar to hot water.

Performance range of mode QD (G) series

Flow: 1 5-3 00m3/h　　Corollary power: 75-1 250kW

Head: 390-1050m　　Inlet diameter: 65-200mm

型号意义说明 MODEL MEANING

QD (G)　6- 25×5

级数	No．of stages
单级扬程(m)	Head of single stage (m)
流量 (m3/h)	Flow(m3/h)
多级锅炉给水泵	Multistage boiler water supply pump

结构说明 ABOUT THE STRUCTURE

本系列的卧式多级离心泵为两端支承，壳体部分是节段式，泵的传动方式是通过弹性联轴器与电动机联接，泵的旋转方向，从驱动端看，泵为顺时针方向旋转。泵的结构说明参见图 l。

定子部分

主要由吸入段、中段、吐出段、导叶、填料函体等分别用拉紧螺栓联接成一体，吐出口及吸入口均为垂直向上。

转子部分

For this series horizontal multistage centrifugal pump, both ends of it are supported, the casing portion is in a sectional form. it is connected to and actuated by a motor via a resilient clutch and the rotating direction of it. viewing from the actuating end. is clockwise. Refer to Fig. I for the structure of it.

Stator portion

Consists of suck-in section. middle-section, spitting section,guide vane, packing etc., which are linked together with a take-up bolt. with both suck-in and spitting mouths

主要由轴、叶轮、平衡盘及轴套等零件组成。

轴承部分

整个转子由轴两端的滚柱轴承或滑动轴承来支承，轴承采用油脂润滑或 20#机油。

密封及冷却

泵壳体中的吸入段、中段、吐出段之间的结合面涂以二 硫化钼润滑脂密封。转子部分与固定部分之间靠密封环,导叶套,填料等密封。轴封的填料松紧程度必须适当，以液体能一滴一滴渗出为宜。禁止空车下运行。当密封环和导叶套的磨损程度已影响泵的工作和性能时，应予以及时更换。在轴的轴封处装有可更换的轴套保护泵轴。

使用时，轴封一定要接水封水。当被输送的介质温度高于 80℃时，必须向水冷填料压盖和轴封冷却室通入冷却水。冷却水和水封水均为常温清水。冷却水水压为 1.5~3 Kg/cm2，水封水压力要高于密封腔压力 0.5~lKg/cm2。各型泵冷却水管路接口位置不同，管路接口沿轴向位置见泵结构图，径向位置见表 1。轴封分为填料密封和机械密封，填料密封的水封水为工业水，压力为 2~3kg/cm2。机械密封的冲洗水为软化水,压力须比进口压力大 3kg/cm2 以上

vertically upward.

Rotor portion

Consists of a shaft, impeller, balancing disk, muff etc. Parts.

Bearing portion

The whole rotor is supported by the roller bearings or sliding bearings on both ends of the shaft and the bearings are lubricated with grease or 20# engin oil.

Cooling and seal of pump

The joint-part between suction section, intermediate section and discharge section with be coated with molybdenum disulfide lubricating grease as seal. Rotor and fixed parts will be sealed by seal ring,guide-vane jacket and packing. The packing tensile degree of shaft seal should be proper and seep should be feasible dip by dip Unload run should be forbid. The seal ring and guide vane jacket should be replaced if they are too worn to be used any more and even do harm to pump work. There is spare shaft sleeve near shaft seal to protect shaft of pump.

The shaft seal should perform to hold water and seal water. When temperature of the liquid transferred is above 80℃.cooled water should be filled to the water cooling packing gland and shaft seal cooling chamber. Cooled water and seal water should be clean water in normal degree. The pressure of cooled water should be l.5~3Kg/cm2, pressure of seal water should be more than 0.5~1 Kg/cm^2 of the seal chamber. The positions of cooling water pipe joints are different for various kind of water pump. Please refer to construction drawing of pump for axial position, and refer to chart I for radial position.

Shaft seals are classified as packing seal and mechanical seal.The water seal water of packing seal is industrial water, with pressure of 2~3kg/cm2. The flushing water of mechanical seal is softened water, whose pressure shall be 3kg/cm2 higher than the inlet pressure.

QD(G)型多级泵结构图

STRUCTURE DRAWING OF QD(G) MODEL MULTISTAGE PUMP

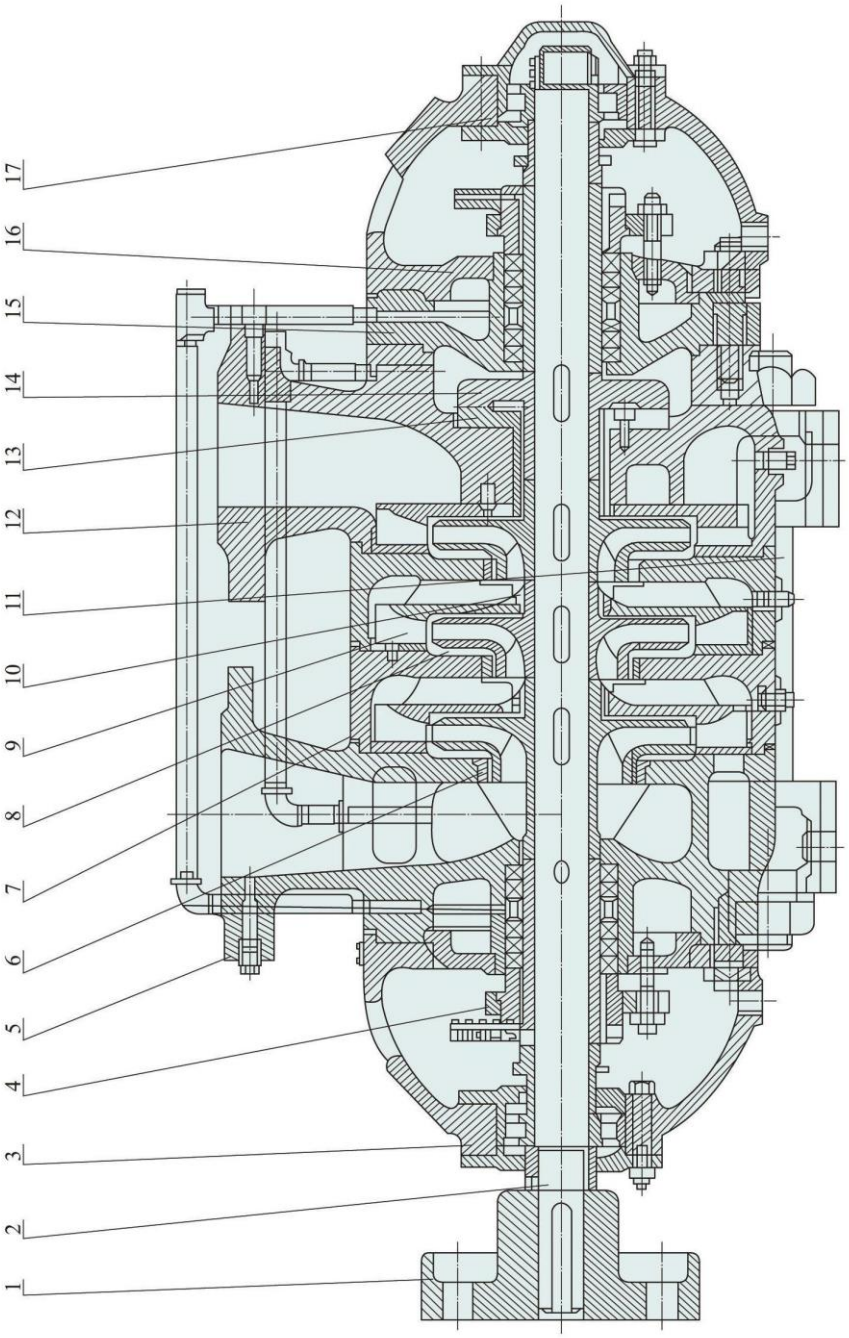


图1 fig.1

1	柱销弹性联轴器部件 Column resilient clutch part	2	轴 Shaft	3	滚动轴承部件 Roller bearing part	4	水冷填料压盖 Water cooled packing gland	5	吸入段 Suck-in section	
6	密封环 Seal ring	7	中段 Middle section	8	叶轮 Impeller	9	导叶 Guide vane	10	导叶套 Guide vane sleeve	
11	拉紧螺栓 Take-up bolt	12	吐出段 Spitting section	13	平衡套 Balancing sleeve	14	平衡盘 Balancing disk	15	填料函体 Packing	
16	水冷室盖 Cover of water cooling room	17	轴承 Bearing							

QD(G)型多级泵性能表

PERFORMANCE TABLE OF QD(G) MODEL MULTISTAGE PUMP

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD6-25	2	2950	3.75 6.3 7.5	51 50 49	1.49 1.84 2.08	3	33 45 47	2 2 2.5	77
	3		3.75 6.3 7.5	76.5 75 73.5	2.37 2.86 3.19	4	33 45 47	2 2 2.5	85
	4		3.75 6.3 7.5	102 100 98	3.16 3.81 4.26	5.5	33 45 47	2 2 2.5	94
	5		3.75 6.3 7.5	127.5 125 122.5	3.95 4.77 5.32	5.5	33 45 47	2 2 2.5	102
	6		3.75 6.3 7.5	153 150 147	4.73 5.72 6.39	7.5	33 45 47	2 2 2.5	111
	7		3.75 6.3 7.5	178.5 175 171.5	5.52 6.67 7.45	7.5	33 45 47	2 2 2.5	120
	8		3.75 6.3 7.5	204 200 196	6.31 7.63 8.52	11	33 45 47	2 2 2.5	128
	9		3.75 6.3 7.5	229.5 225 220.5	7.1 8.58 9.58	11	33 45 47	2 2 2.5	137
	10		3.75 6.3 7.5	255 250 245	7.89 9.53 10.65	15	33 45 47	2 2 2.5	145
	11		3.75 6.3 7.5	280.5 275 269.5	8.68 10.5 11.71	15	33 45 47	2 2 2.5	154
	12		3.75 6.3 7.5	306 300 294	9.47 11.44 12.78	15	33 45 47	2 2 2.5	162

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD12-25	2	2950	7.5 12.5 15	56.4 50 46	2.62 3.15 3.55	5.5	44 54 53	2 2 2.5	78
	3		7.5 12.5 15	84.6 75 69	3.93 4.73 5.32	7.5	44 54 53	2 2 2.5	87
	4		7.5 12.5 15	112.8 100 92	5.24 6.3 7.09	11	44 54 53	2 2 2.5	96
	5		7.5 12.5 15	141 125 115	6.55 7.88 8.89	11	44 54 53	2 2 2.5	104
	6		7.5 12.5 15	169.2 150 138	7.85 9.46 10.64	15	44 54 53	2 2 2.5	113
	7		7.5 12.5 15	197.5 175 161	9.16 11 12.41	15	44 54 53	2 2 2.5	121
	8		7.5 12.5 15	225.6 200 184	10.41 12.61 14.18	18.5	44 54 53	2 2 2.5	130
	9		7.5 12.5 15	253.8 225 207	11.78 14.18 15.95	18.5	44 54 53	2 2 2.5	138
	10		7.5 12.5 15	282 250 230	13.09 15.76 17.73	22	44 54 53	2 2 2.5	147
	11		7.5 12.5 15	310.2 275 253	14.4 17.34 19.5	22	44 54 53	2 2 2.5	155
	12		7.5 12. 5 15	338.4 300 276	15.7 18. 9 21. 3	30	44 54 53	2 2 2. 5	165

QD(G) Multistage Centrifugal Pump

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD12-50	2	2950	7.5 12.5 15	108 100 93	5.8 7.6 8.3	11	37.8 48 47	2 2 2.5	142
	3		7.5 12.5 15	162 150 139.5	8.8 10.6 11.9	18.5	37.8 48 47	2 2 2.5	156
	4		7.5 12.5 15	216 200 186	11.7 14.1 15.9	22	37.8 48 47	2 2 2.5	170
	5		7.5 12.5 15	270 250 232.5	14.6 17.7 19.8	30	37.8 48 47	2 2 2.5	183
	6		7.5 12.5 15	324 300 279	17.6 21.3 23.7	30	37.8 48 47	2 2 2.5	197
	7		7.5 12.5 15	378 350 325.5	20.4 24.8 27.7	37	37.8 48 47	2 2 2.5	211
	8		7.5 12.5 15	432 400 372	23.3 28.4 31.7	45	37.8 48 47	2 2 2.5	224
	9		7.5 12.5 15	486 450 418.5	26.3 31.9 35.7	45	37.8 48 47	2 2 2.5	238
	10		7.5 12.5 15	540 500 465	29.2 35.5 39.6	55	37.8 48 47	2 2 2.5	251
	11		7.5 12.5 15	594 550 511.5	32.1 39 43.5	55	37.8 48 47	2 2 2.5	265
	12		7.5 12.5 15	648 600 558	35 42.6 47.8	75	37.8 48 47	2 2 2.5	279

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD25-30	2	2950	15	68	5.56	11	50	2.2	150
			25	60	6.58		62	2.2	
			30	55	7.14		61	2.6	
	3		15	102	8.33	15	50	2.2	166
			25	90	9.88		62	2.2	
			30	82.5	10.7		61	2.6	
	4		15	136	11.1	18.5	50	2.2	181
			25	120	13.1		62	2.2	
			30	110	14.26		61	2.6	
	5		15	170	13.89	22	50	2.2	197
			25	150	16.47		62	2.2	
			30	137.5	17.83		61	2.6	
	6		15	204	16.67	30	50	2.2	212
			25	180	19.17		62	2.2	
			30	165	21.4		61	2.6	
	7		15	238	19.44	30	50	2.2	228
			25	210	23.1		62	2.2	
			30	192.5	24.96		61	2.6	
	8		15	272	22.22	37	50	2.2	244
			25	240	26.4		62	2.2	
			30	220	28.53		61	2.6	
	9		15	306	25	37	50	2.2	259
			25	270	29.65		62	2.2	
			30	247.5	32.1		61	2.6	
	10		15	340	27.8	45	50	2.2	275
			25	300	32.9		62	2.2	
			30	275	35.7		61	2.6	

QD(G) Multistage Centrifugal Pump

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD25-50	2	2950	15	103	9.6	18.5	40	2.5	261
			25	100	12.6		54	2.8	
			30	93	14.3		53	3.2	
	3		15	154.5	15.78	22	40	2.5	280
			25	150	18.91		54	2.8	
			30	144	20.64		53	3.2	
	4		15	206	21.04	30	40	2.5	298
			25	200	25.22		54	2.8	
			30	192	27.5		53	3.2	
	5		15	257.5	26.2	37	40	2.5	317
			25	250	31.52		54	2.8	
			30	240	34.4		53	3.2	
	6		15	309	31.56	45	40	2.5	336
			25	300	37.82		54	2.8	
			30	288	41.28		53	3.2	
	7		15	380.5	38.86	55	40	2.5	355
			25	350	44.1		54	2.8	
			30	336	48.16		53	3.2	
	8		15	421	42	75	40	2.5	374
			25	400	50.46		54	2.8	
			30	384	55.04		53	3.2	
	9		15	463.5	47.33	75	40	2.5	393
			25	450	56.74		54	2.8	
			30	432	61.92		53	3.2	
	10		15	515	52.59	75	40	2.5	411
			25	500	63.04		54	2.8	
			30	480	68.8		53	3.2	
	11		15	566	57.8	90	40	2.5	430
			25	550	69.3		54	2.8	
			30	528	75.68		53	3.2	
	12		15	618	63.11	110	40	2.5	450
			25	600	75.65		54	2.8	
			30	576	82.56		53	3.2	

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD46-30	2	2950	30	68	8.68	15	64	2.4	152
			46	60	10.74		70	3	
			55	54	11.89		68	4.6	
	3		30	102	13.02	22	64	2.4	167
			46	90	16.11		70	3	
			55	81	18.84		68	4.6	
	4		30	136	17.36	30	64	2.4	183
			46	120	21.48		70	3	
			55	108	23.79		68	4.6	
	5		30	170	21.7	37	64	2.4	198
			46	150	26.85		70	3	
			55	135	29.74		68	4.6	
	6		30	204	26.4	37	64	2.4	214
			46	180	32.21		70	3	
			55	162	35.68		68	4.6	
	7		30	238	30.38	45	64	2.4	229
			46	210	37.58		70	3	
			55	189	41.63		68	4.6	
	8		30	274	34.72	55	64	2.4	245
			46	240	42.95		70	3	
			55	216	47.58		68	4.6	
	9		30	306	39.06	55	64	2.4	261
			46	270	48.32		70	3	
			55	243	53.53		68	4.6	
	10		30	340	43.3	75	64	2.4	276
			46	300	53.7		70	3	
			55	270	59.5		68	4.6	

QD(G) Multistage Centrifugal Pump

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD46-50	2	2950	30	111	16.78	30	54	2.5	262
			46	100	19.88		63	2.8	
			55	92	21.52		64	3.2	
	3		30	166.5	25.19	37	54	2.5	281
			46	150	29.83		63	2.8	
			55	138	32.3		64	3.2	
	4		30	222	33.59	45	54	2.5	300
			46	200	39.77		63	2.8	
			55	184	43.06		64	3.2	
	5		30	277.5	41.98	75	54	2.5	319
			46	250	49.71		63	2.8	
			55	230	53.85		64	3.2	
	6		30	333	50.38	75	54	2.5	338
			46	300	59.65		63	2.8	
			55	276	64.59		64	3.2	
	7		30	388.5	58.78	90	54	2.5	356
			46	350	69.6		63	2.8	
			55	322	75.36		64	3.2	
	8		30	440	67.18	90	54	2.5	375
			46	400	79.54		63	2.8	
			55	368	86.12		64	3.2	
	9		30	499.5	75.57	110	54	2.5	394
			46	450	89.48		63	2.8	
			55	414	96.89		64	3.2	
	10		30	555	83.97	132	54	2.5	412
			46	500	99.42		63	2.8	
			55	460	107.6		64	3.2	
	11		30	610.5	92.37	132	54	2.5	432
			46	550	109.3		63	2.8	
			55	506	118.4		64	3.2	
	12		30	666	100.8	160	54	2.5	451
			46	600	119.3		63	2.8	
			55	552	129.2		64	3.2	

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD85-45	2	2950	55	102	24.25	37	63	3.2	210
			85	90	28.92		72	4.2	
			100	78	30.35		70	5.2	
	3		55	153	36.38	55	63	3.2	232
			85	135	43.37		72	4.2	
			100	117	45.52		70	5.2	
	4		55	204	48.5	75	63	3.2	253
			85	180	57.87		72	4.2	
			100	156	60.7		70	5.2	
	5		55	255	60.63	90	63	3.2	274
			85	225	72.34		72	4.2	
			100	195	75.86		70	5.2	
	6		55	306	72.75	110	63	3.2	295
			85	270	86.81		72	4.2	
			100	234	91.04		70	5.2	
	7		55	357	84.88	132	63	3.2	317
			85	315	101.3		72	4.2	
			100	273	106.2		70	5.2	
	8		55	408	97	132	63	3.2	338
			85	360	115.7		72	4.2	
			100	312	121.4		70	5.2	
	9		55	459	109.1	160	63	3.2	359
			85	405	130.2		72	4.2	
			100	351	136.6		70	5.2	

QD(G) Multistage Centrifugal Pump

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD85-67	2	2950	55	148	38.2	55	58	3.3	428
			85	134	45.6		68	4	
			100	122	48.9		68	4.4	
	3		55	222	57.3	90	58	3.3	498
			85	201	68.4		68	4	
			100	183	73.3		68	4.4	
	4		55	296	76.4	110	58	3.3	568
			85	268	91.2		68	4	
			100	244	97.7		68	4.4	
	5		55	370	95.6	132	58	3.3	638
			85	335	114		68	4	
			100	305	122.2		68	4.4	
	6		55	444	114.7	160	58	3.3	708
			85	402	136.9		68	4	
			100	366	146.6		68	4.4	
	7		55	518	133.8	185	58	3.3	778
			85	469	159.6		68	4	
			100	427	171		68	4.4	
	8		55	592	152.9	220	58	3.3	848
			85	536	182.4		68	4	
			100	488	195.4		68	4.4	
	9		55	666	172	250	58	3.3	918
			85	603	205.2		68	4	
			100	549	219.9		68	4.4	

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD155-30	2	1480	119	64	29.8	45	69.5	3.2	476
			155	60	33.71		75	3.9	
			190	54	36.95		76	4.8	
	3		119	96	44.7	75	69.5	3.2	546
			155	90	50.57		75	3.9	
			190	81	55.42		76	4.8	
	4		119	128	59.6	90	69.5	3.2	617
			155	120	67.42		75	3.9	
			190	108	73.9		76	4.8	
	5		119	160	74.5	110	69.5	3.2	687
			155	150	84.28		75	3.9	
			190	135	92.37		76	4.8	
	6		119	192	89.4	132	69.5	3.2	757
			155	180	101.1		75	3.9	
			190	162	110.8		76	4.8	
	7		119	224	104.3	160	69.5	3.2	827
			155	210	118		75	3.9	
			190	189	129.3		76	4.8	
	8		119	256	119.2	200	69.5	3.2	897
			155	240	134.8		75	3.9	
			190	216	147.8		76	4.8	
	9		119	288	134.1	200	69.5	3.2	968
			155	270	151.7		75	3.9	
			190	243	166.3		76	4.8	
	10		119	320	149	220	69.5	3.2	1038
			155	300	168.6		75	3.9	
			190	270	184.7		76	4.8	

QD(G) Multistage Centrifugal Pump

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD155-67	2	2950	100	152	64.7	90	64	3.2	432
			155	134	76.5		74	5	
			185	118	82.6		72	6.6	
	3		100	228	97	132	64	3.2	502
			155	201	114.7		74	5	
			185	177	123.9		72	6.6	
	4		100	304	129.3	185	64	3.2	572
			155	268	152.9		74	5	
			185	236	165.1		72	6.6	
	5		100	380	161.6	220	64	3.2	641
			155	335	191.1		74	5	
			185	295	206.4		72	6.6	
	6		100	456	194	280	64	3.2	712
			155	402	229.3		74	5	
			185	354	247.7		72	6.6	
	7		100	532	226.3	315	64	3.2	782
			155	469	267.5		74	5	
			185	413	288.9		72	6.6	
	8		100	608	258.6	355	64	3.2	852
			155	536	305.7		74	5	
			185	472	330.3		72	6.6	
	9		100	684	290.9	450	64	3.2	922
			155	603	344		74	5	
			185	531	371.6		72	6.6	

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD280-43	2	1480	185	94	68.6	110	69	3	667
			280	86	85.2		77	4.7	
			335	76	92.5		75	6	
	3		185	141	103	160	69	3	787
			280	129	127.7		77	4.7	
			335	114	138.7		75	6	
	4		185	188	138.3	200	69	3	908
			280	172	170.3		77	4.7	
			335	152	184.9		75	6	
	5		185	235	171.6	250	69	3	1028
			280	215	212.9		77	4.7	
			335	190	231.1		75	6	
	6		185	282	205.9	315	69	3	1149
			280	258	255.5		77	4.7	
			335	228	277.3		75	6	
	7		185	329	240.2	355	69	3	1271
			280	301	298.1		77	4.7	
			335	266	323.6		75	6	
	8		185	376	274.5	400	69	3	1391
			280	344	340.7		77	4.7	
			335	304	369.8		75	6	
	9		185	423	308.9	450	69	3	1512
			280	387	383.2		77	4.7	
			335	342	416		75	6	

QD(G) Multistage Centrifugal Pump

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD280-65	2	1480	185	136	102.2	185	67	2.8	824
			280	130	135.8		73	3.7	
			335	124	1593		71	5	
	3		185	204	153.4	280	67	2.8	1006
			280	195	203.7		73	3.7	
			335	186	238.9		71	5	
	4		185	272	204.5	355	67	2.8	1188
			280	260	271.6		73	3.7	
			335	248	318.6		71	5	
	5		185	340	255.7	450	67	2.8	1370
			280	325	339.5		73	3.7	
			335	310	398.3		71	5	
	6		185	408	306.6	500	67	2.8	1552
			280	390	407.4		73	3.7	
			335	372	477.8		71	5	
	7		185	476	357.9	630	67	2.8	1734
			280	455	475.3		73	3.7	
			335	434	557.7		71	5	
	8		185	544	409.1	710	67	2.8	1916
			280	520	543.2		73	3.7	
			335	496	637.3		71	5	
	9		185	612	460.2	800	67	2.8	2098
			280	585	611.1		73	3.7	
			335	558	716.9		71	5	
	10		185	680	511.3	900	67	2.8	2280
			280	650	678.9		73	3.7	
			335	620	796.7		71	5	
	11		185	748	562.5	900	67	2.8	2460
			280	715	746.9		73	3.7	
			335	682	876.3		71	5	
	12		185	816	613.6	1000	67	2.8	2645
			280	780	814.8		73	3.7	
			335	744	955.9		71	5	

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD360-40	2	1480	300	84	89.1	132	77	4.65	676
			360	80	98.1		80	4.7	
			440	71	110.5		77	5.4	
	3		300	126	133.7	185	77	4.65	807
			360	120	147.2		80	4.7	
			440	106.5	165.8		77	5.4	
	4		300	168	178.2	250	77	4.65	938
			360	160	196.2		80	4.7	
			440	142	221.1		77	5.4	
	5		300	210	222.8	315	77	4.65	1069
			360	200	245.3		80	4.7	
			440	177.5	276.3		77	5.4	
	6		300	252	257.4	400	77	4.65	1200
			360	240	294.1		80	4.7	
			440	213	331.5		77	5.4	
	7		300	294	311.9	450	77	4.65	1331
			360	280	343.1		80	4.7	
			440	248.5	386.7		77	5.4	
	8		300	336	356.5	500	77	4.65	1462
			360	320	392.2		80	4.7	
			440	284	441.9		77	5.4	
	9		300	378	401.1	560	77	4.65	1593
			360	360	441.2		80	4.7	
			440	319.5	497.2		77	5.4	
	10		300	420	445.6	630	77	4.65	1724
			360	400	490.2		80	4.7	
			440	355	552.4		77	5.4	

QD(G) Multistage Centrifugal Pump

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD450-60	2	1480	335	130	164.7	250	72	4.1	1500
			450	120	186.1		79	5.2	
			500	113	197.3		78	6.3	
	3		335	195	247.1	355	72	4.1	1750
			450	180	279.2		79	5.2	
			500	171	296		78	6.3	
	4		335	260	329.5	450	72	4.1	2000
			450	240	372.2		79	5.2	
			500	228	394.7		78	6.3	
	5		335	325	411.8	630	72	4.1	2250
			450	300	465.4		79	5.2	
			500	285	493.4		78	6.3	
	6		335	390	494.2	710	72	4.1	2500
			450	360	558.3		79	5.2	
			500	342	592		78	6.3	
	7		335	455	576.5	800	72	4.1	2750
			450	420	651.5		79	5.2	
			500	399	690.7		78	6.3	
	8		335	520	658.9	900	72	4.1	3000
			450	480	744.4		79	5.2	
			500	456	789.4		78	6.3	
	9		335	585	741.2	1000	72	4.1	3250
			450	540	837.5		79	5.2	
			500	513	888		78	6.3	
	10		335	650	823.6	1120	72	4.1	3500
			450	600	930.8		79	5.2	
			500	570	995.1		78	6.3	

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD500-57	2	1480	450	120	184	250	80	4.4	1500
			500	114	192		81	5	
			550	108	205		79	5.8	
	3		450	180	276	355	80	4.4	1750
			500	171	287.5		81	5	
			550	162	307.5		79	5.8	
	4		450	240	368	450	80	4.4	2000
			500	228	383.5		81	5	
			550	216	307.5		79	5.8	
	5		450	300	460	630	80	4.4	2250
			500	285	479.5		81	5	
			550	270	512		79	5.8	
	6		450	360	551.5	710	80	4.4	2500
			500	342	575		81	5	
			550	324	614.5		79	5.8	
	7		450	420	643.5	800	80	4.4	2750
			500	399	671		81	5	
			550	378	716.7		79	5.8	
	8		450	480	735.5	1000	80	4.4	3000
			500	456	767		81	5	
			550	432	819		79	5.8	
	9		450	540	827.5	1120	80	4.4	3250
			500	513	862.5		81	5	
			550	486	921.5		79	5.8	
	10		450	600	919.5	1250	80	4.4	3500
			500	570	958.5		81	5	
			550	540	1024		79	5.8	

QD(G) Multistage Centrifugal Pump

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量
					轴功率 Shaft	电机功率 Motor			kg
QD580-60	2	1480	450	130	202	280	79	3.16	1750
			580	120	231		82	4.84	
			638	110	239		80	5.16	
	3		450	195	302	450	79	3.16	1950
			580	180	346		82	4.84	
			638	165	359		80	5.16	
	4		450	260	403	560	79	3.16	2260
			580	240	462		82	4.84	
			638	220	479		80	5.16	
	5		450	325	504	710	79	3.16	2570
			580	300	578		82	4.84	
			638	275	599		80	5.16	
	6		450	390	605	800	79	3.16	2880
			580	360	694		82	4.84	
			638	330	718		80	5.16	
	7		450	455	706	900	79	3.16	3190
			580	420	809		82	4.84	
			638	385	838		80	5.16	
	8		450	520	806	1120	79	3.16	3500
			580	480	924		82	4.84	
			638	440	958		80	5.16	
	9		450	585	907	1250	79	3.16	3810
			580	540	1040		82	4.84	
			638	495	1077		80	5.16	
	10		450	650	1008	1250	79	3.16	4120
			580	600	1155		82	4.84	
			638	550	1197		80	5.16	

型号 Model	级数 No.of Stage	转速 Speed (r/min)	流量 Flow (m3/h)	扬程 Head (m)	功率 Power(kW)		效率 Eff. (%)	必需汽蚀余量 NPSH)r (m)	重量 kg
					轴功率 Shaft	电机功率 Motor			
QD720-60	2	1480	550	132	260	355	76	3.5	1830
			720	120	294		80	4.5	
			850	108	318.4		78.5	5.5	
	3		550	198	390	560	76	3.5	2040
			720	180	441		80	4.5	
			850	162	477.6		78.5	5.5	
	4		550	264	520	710	76	3.5	2350
			720	240	588		80	4.5	
			850	216	636.8		78.5	5.5	
	5		550	330	640	900	76	3.5	2650
			720	300	735		80	4.5	
			850	270	796		78.5	5.5	
	6		550	396	780	1120	76	3.5	2960
			720	360	882		80	4.5	
			850	324	955.2		78.5	5.5	
	7		550	462	910	1250	76	3.5	3280
			720	420	1029		80	4.5	
			850	378	1114.4		78.5	5.5	
	8		550	528	1040	1400	76	3.5	3595
			720	480	1176		80	4.5	
			850	432	1273.6		78.5	5.5	
	9		550	594	1170	1600	76	3.5	3900
			720	540	1323		80	4.5	
			850	486	1432.8		78.5	5.5	

泵的装配与检测 ASSEMBLY AND DETECTION OF PUMP

本型泵装配质量的好坏对泵的性能及运行稳定性影响特别显著。诸如叶轮出口中心与导叶进口中心的对准，泵的转子部分与定子部分的各个密封间隙值大小均匀等，装配时应按图纸的技术要求，方能保证装配质量。

The assembly quality of the pump will result in a notable affection to the performance and the running stability of it and can not be guaranteed unless the technical requirements in the drawings are strictly followed in the assembly, such as on the alignment between the centers of the impeller's outlet and the guide vane's inlet. the uniform values of the sealing intervals of both rotor and stator portions etc.

1、转子部件

以两轴承为支承分别测量叶轮口环，叶轮挡套(或轮后脐子)，平衡挡套和轴套的圆跳动值及平衡盘端面的跳动值应符合转子结合部件图纸（图 4）的要求

1.Rotor

It takes two bearings as the support and measure the circle jumping values of the oral ring of the impeller, the impellers baffling sleeve (or rear navel), the balancing baffling sleeve and the muff, respectively, and the jumping value of the balancing disk's end-face, which should conform the requirements in the figure of the jointed parts of rotor (Fig. 4).

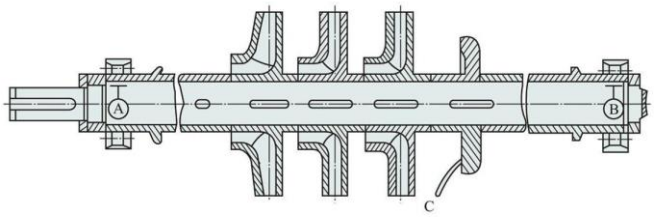


图 4 Fig. 4

泵体密封环与叶轮密封环的名义径向间隙，按下表

For the nominal radial intervals of the seal rings of both pump casing and impeller, upon the table below:

名义尺寸（mm）Nominal size(mm)	30~90	>90~120	>120~180	>180~250	>250~500	>500~800	>800~1250	>1250
直径间隙（mm）Diameter interval(mm)	0.3~0.4	0.4~0.5	0.5~0.6	0.6~0.7	0.7~0.85	0.85~1.2	1.2~1.6	1.6~2.0

装配好的转子部件，各零件的径向跳动允差，按下表：

For the allowed radial jumping error of each part of the assembled rotor,upon the table below:

名义直径 Nominal Diameter	≤50	＞50~120	＞120~260	＞260~500	＞500~800
叶轮密封环（A-B）Seal ring of impeller (A-B)	0.08	0.10	0.10	0.12	0.15
平衡盘 C 的端面跳动（A-B）End-face jumping of disk C (A-B)	0.05	0.05	0.06	0.08	0.08

2,定子部件
测量转子轴向串量、平衡环（套）的端面跳动值，应符合总装图的要求。

3,装配完毕，用手转动转子，检查泵内是否有摩擦声或转动不灵活等不正常现象。

2．Stator
Measure the axial serial amount of the rotor and the end-face jumping value of the balancing ring(sleeve),which should conform the requirements in the overall assembly drawing.
3,At the end of assembly,move the rotor with hand to check if there is frictional sound,non-flexible movement etc.abnormal condition inside of the pump.

泵的安装 INSTALLATION OF PUMP

1. 泵的安装步骤
泵的安装步骤一般包括把泵放到地基上，找水平、调正和联接泵的管路等。

2. 泵安装需要的设备
泵安装时需要下列常规的设备和工具

a.有合适负载能力而安全的起重设备

b.每个地脚螺钉处都必须有一块钢的垫铁或契铁，做找平底座用。

c.灌浆的材料必须是不收缩的灌浆料,为了灌浆需准备一个木盒，而且需配有漏斗

d.为了安装和拆卸填料，需要一套专用的工具

3. 泵的搬运
在搬运时要注意安全以防事故发生，搬运时要注意下列事项：

a. 在搬运泵时，起重机的吊钩应挂在底座下面，也可用叉式起重机搬运泵，不允许吊在泵和原动机和螺栓孔或吊泵的轴承体，更不能在泵轴处起吊。

b. 起重负载应均匀平衡，且应注意起重设备的承载能力，起吊时候应小心谨慎，防止泵件的碰撞，特别应避免泵联轴器处轴加工配合面的损坏。

c. 严禁异物或灰尘在搬运过程中进入泵和电动机内。

4. 泵的开箱检查

1.Installation steps
Generally covering the placement of the pump on the foundation, leveling, adjustment and connection of the pump's pipeline.

2. Facilities necessary for installation
The following common facilities and tools are required in installation:
a. Safe lifters available with a proper loading capacity.
b.Set a steel horn or wedge horn on every foot screw for leveling foundation.
c.The grouting material must be a non-shrinking one and it is necessary to prepare a wood case for grouting, which has to be fitted with a hopper.
d.To mount and remove the packing, a set of special tools is required. such as the clamp with hooks.

3.Pump transportation
When to transport the pump, take care of safety to prevent any accident from occurring and the following cautions:
a.Place the hook of the lifter under the foundation or use a folk lifter, do not lift it with the hook in the pump, the prime mover and bolt holes or on the bearing, furthermore, on the pump shaft.
b.Make the lifted load even and balanced, take care about the lifting capacity and not to let the pump parts collided with each other, especially the processed fitting-surface of the shaft on the pump clutch, not to let it damaged.
c.Prohibited foreign matters or dust from getting into both pump and motor during transportation.

4.Unpacking and checkof pump

泵运到使用单位后应开箱检查泵的零件是否丢失，是否在运输过程中有损坏，如果出现丢失或损坏时。应立即向运输部门和泵制造厂声明。

5.暂时库存

如果泵需要在安装以前库存一段时间，泵仍然需要包装，而且应放在干燥，防雨，防灰尘的合适地面上，泵的吐出口和吸入口应盖住，以防异物进入。泵的轴，轴承和其它精加工的零件应注意防潮，应涂保护油层。

6.泵的基础

6.1 泵的基础必须具有足够强度和尺寸的混凝土地基，基础的质量约等于机组质量 3~5 倍，泵的地基就比泵的底座长出 50~70mm,且要留出地脚孔（为地脚螺栓 3~4 倍的钢管直径）

6.2 打地基包括如下内容：地基的脚底螺栓孔的定位，灌浆和留出联接管路位置，然后在其余空间灌浆。

6.3 地基表面可以是粗糙的，以使灌浆效果好。

6.4 地基完全固化再安装设备。

7.搬放和找水平

7.1 在底座下面放置钢的垫铁和楔铁或调整垫，一般都放置在地脚螺栓处，如果底座较长。在两地脚螺栓中间可放置一块垫铁。

7.2 检查底座下面的地基，清洗灰尘、油和其它杂物；

7.3 起重吊钩底座的四个角上，把底座吊在地基上方，慢慢地把底座放在每个螺栓孔的位置上（对地脚螺孔的位置）；

7.4 用一个刀口平尺和机械水平仪放到泵和电机底脚加工平面上，用调整楔铁或调整垫的厚度来确定底座在各个方位上的水平，推荐每 l00mm 长不平度小于 0.25mm，这时地脚螺栓的螺母拧到适当的程度（不能过紧），楔铁或调整垫片应紧固；

7.5 底座找平，而且和地基配合较紧后再灌浆。

8、底座的灌浆

Unpack and check, when the pump arrives. If any part is lost and if there is any damage, report it to the transporter and the pump manufacturer at once if any.

5.Temporary storage

If the pump is to be stored for a period of time before installation, pack it and place it on a dry, rain-proof and dust-proof ground with both spitting and suck-in mouths covered to prevent foreign matters in.Pay attention not to let the shaft, bearing and other precisely processed parts of the pump getting wet and coat them with a protective oil layer.

6.Basis for the pump

6.1 The basis should be a concrete one of sufficient strength and size. with the mass of it 3-5 times that of the unit one, and 50-70mm longer than that of the pump foundation, plus the foot bolt holes (a steel pipe's diameter 3-4 times that of the foot bolt).

6.2 The job to set the basis covers: locating the foot bolt hole. grouting and leave the place for the pipeline connection, then grouting into the other space.

6.3 The rougher the surface of the basis. the better the grouting effect.

6.4 Do not install any equipment until the basis gets completely solidified.

7.Movement, placement and leveling

7. 1 Place steel and wedge horns or regulating iron at the foot bolts under the pump foundation, in general, place a horn in between two bolts in case of a longer foundation.

7.2 Check the basis under the pump foundation and clear dust. oil and other foreign matters.

7.3 Place lifting hooks on the four corners of the foundation to lift it above the basis and then slowly put it on the position with the boltholes aligned.

7.4 Place a knife edge flat ruler and a mechanical leveler under the processed planes of both pump and motor's found at ions and use the thickness of a regulating wedge iron or pad to decide the levelness of the foundation on every respect, for which, non-flatness less than 0.25mm per l00mm is recommended. Then tighten the nut of the foot bolt to a proper extent (not over-tightened) and secure the wedge iron or regulating pad.

7.5 Level the foundation, do not grout until it is more closely fitted with the basis.

8.Grout the foundation

8.1 灌浆时，确保做到每个空间的空气必须全部排出；

8.2 当灌浆材料固化后，拧紧地脚螺栓的螺母，然后再对灌浆材料涂油漆防潮；

8.3 灌浆盾，进行泵和电动机的调正工作。

9、设备的调整

设备调正包括角度调正和中心线位置的调正，至少应在下面三个时期检查设备，进行调正：

第一次，泵和底座已经紧固，但电动机没紧固；

第二次，泵和电动机已紧固，但吸入和吐出管路法兰的螺栓没紧固；

第三次，在泵运转 24 小时后，再检查一次，检查后把泵和电动机最后紧固。

在调正工作中应注意以下事宜：

a、在调正以前，检查全部的管线，保证它们不对泵座产生作用或力矩；

b、在调正泵和电动机时，垫片应垫在电动机的下面。角度调正是保证联轴器的两个平行度，用一块千分表去检查联轴器法兰端面上四点，千分表读数为 0.02～0.03，检查其平行度也可用塞尺，两联轴器平面间的差值(a-b)≤0.06(见图 5)。

中心线对中是指泵和电机轴中心线的对正程度，应使 c≤0.08（见图 5）。

10、主要管路的联接

泵灌浆后且紧固在地基上以后，在不受外力条件下对正且联接泵法兰和管路的法兰，这个对正联接不能依靠法兰螺栓的力。对管路支撑 f 附加）应避免管路系统的振动，应减少管路系统进行清洗。

安装管路，应注意事项：

a, 使用管路的规格和长度应适合，且有足够的承压能力，尽量减少管路的转弯和附件；

b, 泵的吸入管路应是短而直，管路直径应大于或等于泵

8.1 Make sure the air inside of each space is completely exhausted when to grout.

8.2 Tighten the nut of the foot bolt when the grouted material is solidified and then coat the material with paint for wet resisting.

8.3 After grouting, adjust both pump and motor.

9.Adjustment of equipment

Covering angle and central line posit ion adjustment. check the equipment at least in the following three periods and take adjustment:

The first time, both pump and foundation are secured while the motor is not.

The second time, both pump and motor are secured while the bolts on the suck-in and spitting pipeline flanges are not.

The third time is in 24 hours after the pump starts running, then secure both pump and motor

Pay attention to the following cautions in the adjustment:

a. Before adjusting, check all pipelines to make sure they will not produce any action or moment on the pump foundation

b. Put the pad under the motor while to adjust both pump and motor.

Angle adjustment is to guarantee the parallelism of the two planes of the clutches. Use a dial gauge to check four points on the end-face of the clutch flange, the reading on the gauge is 0.02-0.03. and use a feeler to check the parallelism, the difference (a-b) between the two planes is <=0.06(see Fig. 5)

Central line alignment means the aligned degree between the central lines of both pump and motor's shafts,

c should be<=0.08 (see Fig. 5)

10.Connect of the main pipelines

After grouting and securing the pump on the basis, align and link the flanges of both pump and pipeline without subject to an external force, i.e. the force from the flange bolt.

For the pipeline support (additional). It should be able to avoid the pipeline vibration and reduce the cleaning to the pipeline.

Cautions in the installation of the pipeline:

a.The pipeline used should be of a proper norm and length and a sufficient bearing capacity, reducing both bends and fittings of the pipeline as can as possible.

的吸入口的直径，泵的吸入管路的弯曲半径应做成尽量大。

b.The suck-in pipeline of the pump should be short and straight, the diameter of it should be equal or more than that of the pump's suction inlet and the bent radius of the suck-in pipeline should be made as big as possible.

11、附加设备的联接

11.l 压力表

在吸入管路和吐出管路上用的压力表必须是质量好性能合格的仪表。吐出压力表最好装配在泵和主管路的吐出法兰 2 倍直径长的距离上，不能装在弯管和阀的旁边，以防受不稳定流动的干扰。

11.Connect of the additional equipment

11.1 Pressure gauge

The pressure gauges used on both suck-in and spitting pipe lines must be good quality and certified performance. It is better for the spitting pressure gauge to be mounted at the distance 2 times of the diameter of the spitting flange of both pump and main pipeline while not by both elbow and valve so as to prevent the disturbance from unstable flowing.

11.2 联轴器

泵和电机联轴器联接以前重新检查其对中性；检查电动机的转向是否符合要求，泵轴的转向：从联轴器方向看泵为顺时针方向旋转，如果电动机转向不符合泵轴的转向，必须把电动机转向调正过来。

11.2 Coupler

Recheck the alignment before connecting the coupler of both pump and motor; check whether the steering of the motor meets the requirements, and the steering of the pump shaft: the pump rotates clockwise from the direction of the coupling. If the steering of the motor does not match the steering of the pump shaft, the steering of the motor must be adjusted.

11.3 轴封

如果需要，在泵转动以前，重新调整轴封或重新装配。

11.3 Shaft seal

Readjust or reassemble the shaft seal before the pump starts if necessary.

泵的运转 RUNNING OF THE PUMP

1、操作注意事项

1.1 泵只能允许在规定的参数范围内运转；

1.2 泵不允许在吐出阀门关闭或关到很小开度下运转，否 则导致泵发热，降低寿命，如果泵是安装在一个并联系统中，每台泵都要在特定的参数下运行以保证泵的流量；

1.3 泵不能关闭吸入阀运行，否则使泵发生干转，导致泵零件损坏；

1.4 泵输送介质不能含有空气或气体，否则会使泵的流量和扬程不可能准确地测出，同时会产生研磨损坏零件；

1.5 该型泵不能输送带颗粒的材料，否则会降低泵的效率和零件的寿命；

1.6 启泵以前应对泵进行开车前检查。

1.Cautions in operation

1.1 The pump can only be allowed to run within the specified parameters.

1.2 The pump is not allowed to run with the spitting valve closed or closed to a little opening, or it will be caused heated and duration lowered. Each pump is required to run under the special parameters so as to guarantee the flow of it if mounted in a parallel system.

1.3 The pump can not run with the suck-in valve closed, or it may be dried moving to cause parts damaged.

1.4 The medium the pump transports can not contain air or gas, or both flow and head of the pump may not be accurately measured and, meanwhile, grinding maybe produced to damage parts.

1.5 This pump is not allowed to transport any material with grains, or both pump efficacy and part duration may be

lowered.
1.6 Check the pump before starting it.

2、启泵前检查

2.1 启泵前，检查全部螺栓、管路及引线的联接是否紧固；
2.2 检查全部仪表、阀门及仪器是否正常；
2.3 检查油环位置、油位计的油是否正常；
2.4 检查电动机的转向是否正确。

2.Check before starting the pump

2. I Before starting the pump, check if all the bolts, pipelines and the lead-wires are securely connected.
2.2 Check if all the meters, valves and instruments are normal.
2.3 Check if the oil ring's position and the oil in the oil leveler are normal.
2.4 Check if the motor moves in the correct direction.

3、泵的启动

3.1 泵启动时注意事项
a、该型泵输送介质温度较高（＜160℃);
b、启动时观察压力表和开关的指示，以便调整；
c、泵启动后，不能使吐出阀关闭或接近关闭较长时间，否则会使泵内液体过热。
3.2 启泵步骤
a、首先进行启动前（按前述步骤）；
b、打开泵的吸入阀和水封水管路的阀；
c、关闭吐出管路，使泵内充满液体；
d、起动电机，接着打开吐出管路的阀。

3.Start the pump

3. 1 Precautions when starting the pump
a. The temperature of the medium this pump transports is higher（160℃).
b. Look at the indications of both pressure gauge and switch during starting so as to adjust them.
c. After starting the pump, do not let the spitting valve closed or nearly closed for a longer time, or the liquid inside of the pump may become overheated.
3.2 Steps to start the pump
a. First do the before-starting check (as abovementioned).
b. Open the pump's suck-in valve and the water sealed water pipeline's valve.
c. Close the discharge pipeline to have inside of the pump full of liquid.
d. Start the motor and then open the valve on the discharge pipeline.

4、泵运转检查

泵运转后，应立即按 2.2 条的程序每隔一定时间检查仪表，以此确定泵的工作是否正常，而且要检查泵的转速，此外，监测泵的流量、扬程、温度及润滑状况。泵在发生故障时，应停泵，且参照故障排除表进行维修。

4.Check of the pump movement

After the pump starts moving, check the meters every certain time upon the procedure in 2.2 to see if it works normally and the rotating speed of it. In addition, check the flow, head, temperature and lubrication of it. In case of a failure, stop it and repair it by referring the table of trouble shooting.

5、停泵

5.1 将泵的吐出阀关到最小流量，但决不允许关闭泵的吸入阀；
5.2 关闭电动机；
5.3 关闭泵的吐出阀；
5.4 当泵停稳后再关闭泵的吸入阀

5.Stop the pump

5. 1 Close the pump's spitting valve to the smallest flow, but do not close the pump's suck-in valve.
5.2 Turn off the motor.
5.3 Close the pump's spitting valve.
5.4 Then close the sick-in valve when the pump stops stably.

泵的维修 REPAIR OF PUMP

1、概述

为了保持泵高效稳定的工作状况，泵必须经常维修，维修的项目和每次维修间隔时间取决泵的工作条件和泵的运行状况。

2、泵的维护

定期检查泵的性能（如流量、扬程、振动等）而且做好记录，按这些记录数据去分析泵是否工作正常，是否需要维修，或确定要修的哪一个部位。在一般条件下，如果坚持精确地测试、记录、定期的总结记录，那么每隔几个月就可以得到泵是否需要维修的可靠资料。

除在规定时间对泵监测之外，下面的维护是经常的：

a，检查泵底座、泵、电动机是否紧固，如果松动会引起泵的振动；

b、检查仪表、引线的状况；检查管路是否泄漏或松动，或其它形式的损坏，如果需要维修应立即检修；

c、填料压盖不能压的过紧，否则会影响填料的寿命；

d、轴承润滑油每工作 1000 小时更换一次。

1.General

To keep the pump in a high effective and stable work, it must be often repaired, the items of repair and the interval between every repair depend on the working condition and running state of it.

2.Maintenance of pump

Hold a periodic check of the pump's performance (as the flow, head, vibration etc.) And make a record, then analyze the pump upon these recorded data to see if it works normally, needs repairing or decide which portion needs repairing .

In general conditions. Reliable information whether the pump needs repairing can be gained every several months provided that insistent and accurate tests and records as well as periodic summarizing of the records have been made.

In addition to the monitor of the pump at the set time, the followings need to be maintained often:

a.Check if the pump, foundation and motor are secured, causing the pump vibrated if loose.

b.Check the meters and leading-wires' state; check if the pipeline leaks or loosens or gets damaged in any other forms, repair it at once if necessary.

c.Do not let the packing gland pressed too tightly, or the duration of it may be affected.

d. Replace the lubricating oil on the bearings every l000h of work.

故障原因及解决方法 FAILURES AND TROUBLESHOOTING OF THE PUMP

故　障 / Failure	原　因　/ Causes	解决方法 / Troubleshooting
1、水泵不吸入，压力表及真空表的指针 剧烈跳动 Pump not suck in. pointers of pressure gauge and vacuum meter severely jumping	注入水泵的水不够，进水管与仪 表等处漏气 Water injected into the pump insufficient. air leaks from water inlet pipe, meters etc.	再往水泵内注水，拧紧堵塞漏气处 Inject water into pump, tighten the leaking places
2、水泵不吸水，真空表显示高度真空 Pump not suck water, high vacuum shown on vacuum meter	底阀没有打开或己淤塞,吸水管阻力太大，吸入高度太大 Foot valve not opened or blocked up, too big resistance with water sucking pipe, too high suck-in height	校正或更改底阀，清洗或更换吸水管，降低吸水高度 Correct or replace foot valve. clean or replace water sucking pipe, lower the height
3，看压力表水泵出口处是有压力而水泵不出水 Pressure available at pump outlet viewing from pressure gauge while no water out of pump	出水管阻力太大，旋转方向不对，叶轮淤塞，或损坏水泵，转数不够 Too big resistance with water outlet pipe. Wrong rotating direction. impeller blocked up, or pump damaged, insufficient r.p.m	检查或缩短水管及检查电机取下水管接头，清洗或更换叶轮提高转数 Check or shorten outlet pipe, check motor, remove the pipe union, clean or replace impeller. raise r.p.m
4、流量不足 Insufficient flow	水泵淤塞，密封环磨擦过多，转数不足 Pump blocked up, too much friction with seal ring, insufficient r.p.m.	清洗水泵及簪子更换密封环提高转数 Clean pump and pipe, replace seal ring, raise r.p.m
5、水泵消耗的功率过大 Too big power the pump consumes	填料压盖压得过紧，填料室发热，叶轮磨损，水泵供水量增加 Too tightly pressed packing gland, packing room heated, impeller worn out, water supply quantity of the pump in-creases	拧松填料压盖或更换填料，更换叶轮，增加出水管阻力来减少流量 Loosen packing gland or replace packing, replace impeller. increase resistance with outlet pipe to reduce the flow
6、水泵内部声音反常，水泵不上水 Abnormal sound inside of pump, no water lnto pump	流量太大，吸水管内阻力太大，吸水高度过大，在吸水处有空气渗入，所输送液体温度过高 Too big flow, too big resistance inside of water sucking pipe, too high water-sucking height, air gets in the water-sucking place, too high temperature of the liquid being transported	增加出水管内的阻力以减低流量，检查吸水管和底阀，减少吸水高度，拧紧堵塞漏气处 Increase the resistance inside of water outlet pipe to reduce the flow. check water-sucking pipe and foot valve. lower the height. tighten the air leaking places

7、水泵振动 Pump vibrates	泵轴与电机轴线不在同一条中心线上，脏物或水浸入轴承 Axes of pump and motor not on one central line, dirt or water gets into the bearing	把水泵和电机的轴中心线对准，清洗轴承更换润滑脂 Align the two central lines, clean bearing. replace lubricating grease
8、轴承过热 Bearing overheated	润滑脂干固或脏了．水泵轴与电机轴不在同一条中心 线上 Lubricating grease dried or dirty. axes of pump and motor not on one central line	检查或清洗轴承体更换润滑脂把轴中心对正 Check or clean bearing, replace lubricating grease, align the central lines
9、平衡水中断，平衡室发热，电机功率增加 Balancing water stops, balancing room heated. motor's power increased	水泵在大流量低扬程运转，平衡盘与平衡板产生研磨 Pump runs under a big flow and low head. grinding occurs between balancing disk and board	关小出口阀至设计工况运转，拆卸平衡盘进行检修 Close outlet valve to the designed working condition, remove balancing disk for rep- Airing

泵的拆卸

1 当拆卸泵时应注意下列事项：
a、按 5 条停泵程序停泵；
b、将泵壳内的液体放掉（如有冷却水套时也应放掉水）；
c、如果轴承部件是稀油润滑时应将润滑油放掉；
d、拆去防碍拆卸的附属管路，如平衡管、水封水管等管路相引线；
e、应用加热的方法拆卸联轴器（当需要拆卸电机联轴器时亦应如此）。

拆卸顺序

泵的拆卸步骤应从吐出侧的轴承部件开始，其顺序大体如

Removal of pump

1 Cautions in the removal
a. Stop the pump upon the pump stopping procedure in 5 .
b. Drain the liquid inside of the pump casing out (for the cooling water sleeve too if it is available) .
c. Drain out the thinned oil if it is used for lubricating the bearings.
d. Remove the additional pipelines obstructing the removal, such as the balancing pipe, water sealed water pipe etc.
e. Remove the clutches by way of heating (for the motor's clutch too if necessary to remove it).

2 Sequence of removal

Start the pump removal from the bearing on the spitting side,

下：
a、拧下吐出侧轴承压盖上的螺栓和吐出段、填料函体、轴承体三个之间的联接螺母卸下轴承部件；
b、拧下轴上的圆螺母，依次卸下轴承内圈，轴承压盖和挡套后，卸下吐出段（包括填料压盖、填料环、填料等在内）；

c、依次卸下轴上的 0 型密封圈、轴套、平衡盘和键后，卸下吐出段 f 包括末级导叶、平衡板等在内）；
d、卸下末级叶轮和键后，卸下中段（包括导叶在内），按同样方法继续卸下其余各级的叶轮、中段和导叶，直至卸下首级叶轮为止；

e、拧下吸入段和轴承体的联接螺母和拧下轴承压盖上的螺栓后，卸下轴承部件(在这之前应预先将泵联轴器卸下)；

f、将轴从吸入段中抽出，拧下轴上固定螺母，依次将轴承内圈、0 型密封圈、轴套、挡套等卸下。

至此拆卸工作基本完成，但在上述拆卸过程中，还有都份零件互相是联接在一起的，一般情况下拧下联接螺母后即可卸下。

清洗和检查

1 用煤油清洗全部的零件，在空气中干燥或用布擦干；
2 检查全部零件的磨损情况，对不能确保正常运转的零件应更换新的；
3 检查轴是否有尘或生锈，用千分表检查轴的不直度（轴的径向跳动值不大于 8 级精度）；
4 当密封间隙超过推荐值的最大值 50%时，应更换密封元件。

the sequence comes as below:

a. Screw out the bolts on the bearing gland on the spitting side and the linking nuts between the spitting section, packing and bearing to remove the bearing.

b. Screw out the circular nut on the shaft, then in turn remove the inner ring of the bearing, gland and baffling sleeve, then the spitting section (including the packing gland, packing ring, packing etc.).

c. Remove the O-seal ring, muff, balancing disk and key on the shaft in turn, then the spitting section (including the guide vane on the last stage, balancing board etc.).

d. After removing the last-stage impeller and key, remove the middle section (including the guide vane), then the impeller. middle section, guide vane on the rest stages in the same way till the impeller on the first stage.

e. Screw out the linking nuts between the suck-in section and the bearing and the bolt on the bearing gland to remove the bearing (remove the pump clutch prior to this).

f. Draw out the shaft from the suck-in section screw out the fixing nut on it, then remove the inner ring of the bearing, O-seal ring, muff, baffling sleeve etc. in turn). The removal has then been finished generally However some parts are still linked together during the removal and can be removed once the linking nuts are screwed out, in general.

Clean and check

1 Clean all the parts with coal oil and let them dried in the air or with a cloth.
2 Check the worn-out conditions on the all parts and replace those unable to make sure of normal work.
3 Check if there is dust or rust on the shaft and use a dial gauge to check the non-straightness of it (the radial jumping valve of it not more than the 8-class accuracy).
4 Replace the sealing element when the sealing interval is over the maximum value of the recommended one by 50% .

泵的外形和安装尺寸 The outline and installation dimensions of the pump

泵型号	级数	泵+电机外形安装尺寸（共同底座）Pump + motor overall installation dimensions (common base)																						
Model	Stage	L	L电	L1	L2	L3	L4	L5	L6	L7	C	H	H1	H2	H3	H'	HD	AD	B1	B1'	h	B2	B2'	n-Φd
QD6-25	2	996	380	820		575	145	238	130	272	2	150	170	230	170	100	245	180	350	400	30	350	400	4-Φ24
	3	1181	475	1020		645	190		180							132	315	210	370	420		370	420	
	4	1231							230															
	5	1281							280															
	6	1467	605	1240		820	230		330	275				270		160	385	265	360	410	35	430	480	
	7	1517							380															
	8	1567		1390		920	300		430										410	460		480	530	
	9	1617							480															
	10	1712	650	1540		990	350		530										365	415	40	460	510	
	11	1762							580															
	12	1812							630															
QD12-25	2	1132	475	855		575	150	238	130	272	2	150	170	230	170	132	315	210	370	420	35	370	420	4-Φ24
	3	1182		1020		645	190		180															
	4	1366	605	1130					230	275				260		160	385	265	360	410		440	490	
	5	1416				745	205		280															
	6	1466		1240					330													430	480	
	7	1516				820	230		380															
	8	1611	650	1390					430										410	460		480	530	
	9	1661				920	300		480															
	10	1731	670	1475					530					280		180	430	285	340	390		450	500	
	11	1781				975	355		580															
	12	1940	775	1620		965	445		630	277				300		200	475	315	350	400	45	500	550	
QD12-50	2	1407	605	1275		845	220	284	160	339	2	170	215	250	215	160	385	265	460	530	35	460	530	4-Φ24
	3	1512	650						220															
	4	1592	670	1325		880	240		280					260		180	430	285	465	535		465	535	
	5	1761	775	1520		930	310		340	341				280		200	475	315				510	580	
	6	1821							400															
	7	1881							460															
	8	1981	815	1765		1105	440		520					305		225	530	345				545	615	
	9	2041							580															
	10	2216	930	1895	500	1200	420		640					330		250	575	385	460	530		595	665	6-Φ28
	11	2276							700															
	12	2406	1000	2020	600	1300	400		760	340				360		280	640	410				645	715	
QD25-30	2	1414	605	1170		840	190	285	165	342	2	170	210	250	210	160	385	265	480	550	35	480	550	4-Φ24
	3	1479							230															
	4	1589	650	1275		845	220		295										460	530		460	530	
	5	1674	670	1325		880	240		360					260		180	430	285	465	535		465	535	
	6	1848	775	1520		930	310		425	344				280		200	475	315				510	580	
	7	1913							490										445	515				
	8	1978		1685		1075	350		555															
	9	2043							620															
	10	2148	815	1765		1105	440		685					330		225	530	345	465	535		545	615	

AN PUMP

泵型号	级数	泵+电机外形安装尺寸（共同底座）Pump + motor overall installation dimensions (common base)																						
Model	Stage	L	L电	L1	L2	L3	L4	L5	L6	L7	C	H	H1	H2	H3	H'	HD	AD	B1	B1'	h	B2	B2'	n-Φd
QD25-50	2	1552	650	1180		665	280	356	183	346	2	210	270	330	300	160	385	265	480	540	40	480	540	4-Φ24
	3	1632	670	1240					243							180	430	285	500	560		500	560	
	4	1801	775	1430		900	250		303	349						200	475	315	520	580	45	520	580	
	5	1861							363															
	6	1961	815	1570	530	1060	235		423					325		225	530	345	560	620	50	560	620	6-Φ24
	7	2136	930	1760	555	1125	270		483					340		250	575	385	530	590		600	660	
	8	2266	1000	2060	725	1470	380		543					380		280	640	410	500	560		670	730	
	9	2326							603															
	10	2386							663															
	11	2446	1050						723															
	12	2752	1240	2230	745	1490	360		783	274				440		315	865	576	510	580	60	730	800	
QD46-30	2	1414	605	1170		840	190	285	165	340	2	170	210	250	210	160	385	265	480	550	35	480	550	4-Φ24
	3	1544	670	1325		880	240		230					260		180	430	285	465	535		465	535	
	4	1718	775	1520		930	310		295	342				280		200	475	315				510	580	
	5	1783							360															
	6	1848							425															
	7	1953	815	1575		1000			490					305		225	530	345	460	530		540	610	
	8	2133	930	1810		1130	390		555					330		250	575	385	480	550		610	680	
	9	2198							620															
	10	2263	1000	1945		1240	410		685					360		280	640	410	460	530		650	720	
QD46-50	2	1681	775	1430		900	250	356	183	346	2	210	270	330	300	200	475	315	520	580	45	520	580	4-Φ24
	3	1741							243															
	4	1841	815	1570	530	1060	235		303					325		225	530	345	560	630	50	560	630	6-Φ24
	5	2016	930	1760	555	1115	270		363					340		250	575	385	530	590		600	660	
	6	2146	1000	2060	725	1470	380		423					380		280	640	410	500	560		670	730	
	7	2256	1050						483															
	8	2316							543															
	9	2572	1240	2230	745	1490	360		603	349				440		315	865	576	510	580	60	730	800	
	10	2632	1310						663															
	11	2692							723															
	12	2752							783															
QD85-45	2	1640	775	1265		840	200	303	203	337	3	210	250	325	250	200	475	315	520	580	40	520	580	4-Φ24
	3	1869	930	1485		1040	230		277					360		250	575	385	530	590		635	695	
	4	2013	1000	1740	560	1120	310		351					380		280	640	410	520	580		670	730	6-Φ24
	5	2137	1050						425															

泵型号 Model	级数 Stage	泵+电机外形安装尺寸（单独底座）Pump + motor overall installation size (separate base)																											
		L	L电	L1	L2	L3	L4	L5	L6	L7	L8	C	H	H1	H2	H3	H'	HD	AD	B1	B1'	h	n-Φd	A	AA	B	BB	4-ΦK	EC
QD85-45	6	2284	1258	750	380	795	190	303	499	340		4	210	250	345	250	315	865	576	540	600	40	4-Φ26	508	628	406	609	28	392
	7	2428	1328			832			573																	457	660		
	8	2502		900	525	798			647																				
	9	2576				837			721																	508	711		
QD85-67	2	2268	930	765	400	814.5	182.5	490	283	557		4	270	350	420	350	250	575	385	600	670	50	4-Φ30	406	490	349	455	28	308
	3	2476	1050			880.5			371								280	640	410					457	550	419	581		330
	4	2754	1240			950.5			459								315	865	576					508	628	406	609		356
	5	2912	1310			994.5			547																	457	660		
	6	3000		945	580	948.5			635																	508	711		
	7	3000	1222			992.5			723									740	532							457	600		
	8	3408	1540	1125	760	986.5			811								355	1035	680					610	740	560	830		394
	9	3496				1028.5			899																				
QD155-30	2	1937	858	730	450	629	140	355	315	388		4	280	350	400	350	225	530	345	600	680	50	4-Φ26	356	435	311	393	19	302
	3	2181	1000			718.5			430								280	640	410					457	550	368	530	24	330
	4	2346	1050			776			545																	419	581		
	5	2711	1270	1075	795	743			660	418							315	865	576					508	628	406	609	28	386
	6	2896	1340			800.5			775																	457	660		
	7	3011				862			890																	508	711		
	8	3126		1420	1165	722			1005																				
	9	3242				780.5			1120			5																	
	10	3587	1570			876			1235								355	1035	680					610	740	560	830		424
QD155-67	2	2388	1050	765	400	836.5	182.5	490	283	557		4	270	350	420	350	280	640	410	600	670	50	4-Φ30	457	550	419	581	24	330
	3	2736	1310			906			371								315	865	576					508	628	457	660	28	356
	4	2736	1222			950.5			459									740	532								600		
	5	3142	1540	945	580	1032.5			547								355	1035	680					610	740	560	830		394
	6	3230				987.5			635																	630			
	7	3319				1031			723																				
	8	3277	1410	1125	760	985.5			811			5						720	610								855		
	9	4045	2090			1180.5			899								400	1200	790					710	900	1000	1500	35	545
QD280-43	2	2421	1270	735	435	770	150	384	373	385		5	330	400	450	450	315	865	576	700	770	50	4-Φ30	508	628	406	609	28	386
	3	2621	1340			835			503																	508	711		
	4	2751				900			633																				
	5	3111	1570	1125	800	820.5	162.5		763								355	1035	680					610	740	560	830		424
	6	3241				886.5			893																	630			
	7	3702	1900	1385	1060	1100.5			1023	417		6					400	1200	790					710	900	1000	1500	35	545
	8	3832				1035.5			1153																				
	9	3962				1100.5			1283																				

AN PUMP

泵型号 Model	级数 Stage	泵+电机外形安装尺寸（单独底座）Pump + motor overall installation size (separate base)																											
		L	L电	L1	L2	L3	L4	L5	L6	L7	L8	C	H	H1	H2	H3	H'	HD	AD	B1	B1'	h	n-Φd	A	AA	B	BB	4-ΦK	EC
QD280-65	2	2736	1260	555	235	1076.5	160	536	345	623		6	380	500	530	500	315	740	532	790	870	50	4-Φ30	508	628	457	600	28	386
	3	3444	1800	670	310	1243	180		475								355	1070	740					630	800	900	1420		525
	4	3674	1900	1060	700	1003			605								400	1200	790					710	900	1000	1500	35	545
	5	3804				1133			735																				
	6	3935				1263			865			7																	
	7	4315	2150	1190	830	1274			995								450	1350	840					800	1000	1120	1760		565
	8	4445		1450	1090	1154			1125																				
	9	4575				1284			1255																				
	10	4705		1580	1220	1284			1385																				
QD360-40	2	2539	1340	645	340	779.5	150	384	390	415		6	330	400	450	450	315	865	576	700	780	50	4-Φ40	508	628	457	660	28	386
	3	2599	1260			919.5			530									740	532								600		
	4	3049	1570	925	620	817.5			670								355	1035	680					610	740	560	830		424
	5	3189				957.5			810																	630			
	6	3659	1900	1065	760	1078.5			950								400	1200	790					710	900	1000	1500	35	545
	7	3799		1205	900	1078.5			1090																				
QD450-60	2	3357	1800	615	235	1223	190	536	421	589		7	410	550	560	500	355	1070	740	850	950	50	4-Φ42	630	800	900	1420	28	525
	3	3610	1900	770	390	1241			574								400	1200	790					710	900	1000	1500	35	545
	4	3763		920	540	1244			727																				
	5	4166	2150	1230	850	1185			880								450	1350	840					800	1000	1120	1760		565
	6	4319				1260			1033																				
	7	4472		1530	1150	1188			1186																				
	8	4625				1266			1339																				
	9	5048	2420	1840	1460	1353			1492								500	1520	900					900	1120	1250	1940	42	725
	10	5201				1506			1645																				
QD500-57	2	3357	1800	615	235	1223	190	536	421	589		7	410	550	560	500	355	1070	740	850	950	50	4-Φ42	630	800	900	1420	28	525
	3	3610	1900	770	390	1241			574								400	1200	790					710	900	1000	1500	35	545
	4	3763		920	540	1244			727																				
	5	4166	2150	1230	850	1185			880								450	1350	840					800	1000	1120	1760		565
	6	4319				1260			1033																				
	7	4472		1530	1150	1188			1186																				
	8	4625				1422			1339																				
	9	5048	2420	1840	1460	1343			1492								500	1520	900					900	1120	1250	1940	42	725
	10	5201				1418			1645																				
QD580-60	2	3605	1880	757	377	1205	190	599	490	625		7	430	550	580	550	355	1070	740	930	1030	50	4-Φ42	630	800	900	1420	28	525
	3	3825	1900	957	577	1225			690								400	1200	790					710	900	1000	1500	35	545
	4	4025		1157	777				890																				
	5	4475	2150	1357	977	1245			1090								450	1350	840					800	1000	1120	1760		565
	6	4675		1557	1177				1290																				
	7	4875	2420	1757	1377	1405			1490								500	1520	900					900	1120	1250	1940	42	725
	8	5345		1957	1577				1690																				
	9	5545		2157	1777				1890																				
	10	5745		2357	1977				2090																				
QD720-60	2	3655	1900	712	412	1226	150	618.5	518.5	607		7	520	629	700	620	400	1200	790	970	1050	50	4-Φ35	710	900	1000	1500	35	545
	3	3840		897	597				703.5																				
	4	4275	2150	1082	782	1246			888.5								450	1350	840					800	1000	1120	1760		565
	5	4460		1267	967				1073.5																				
	6	4915	2420	1452	1152	1406			1258.5								500	1520	900					900	1120	1250	1940	42	725
	7	5100		1637	1337				1443.5																				
	8	5285		1822	1522				1628.5																				

法兰尺寸表 Flange size table

泵型号 Model	进口法兰 Inlet flange								出口法兰 Outlet flange							
	Dg	D	D1	D2	D3	b	f1/f2	n-Φdo	Dg	D	D1	D2	D3	b	f1/f2	n-Φdo
QD6-25	40	130	100	80	—	18	—/3	4-13.5	40	150	110	88	75	20	4/3	4-17.5
QD12-25	50	140	110	90	—	18	—/3	4-13.5	40	150	110	88	75	20	4/3	4-17.5
QD12-50	50	160	110	90	—	30	—/3	4-13.5	50	175	135	105	87	28	4/3	4—23
QD25-30	65	160	130	110	—	20	—/3	4-13.5	65	185	145	122	109	28	4/3	8-17.5
QD25-50	80	190	150	128	—	18	—/3	4-17.5	80	210	170	140	120	30	4/3	8—23
QD46-30	80	190	150	128	—	22	—/3	4-17.5	65	185	145	122	109	28	4/3	8-17.5
QD46-50	80	190	150	128	—	18	—/3	4-17.5	80	210	170	140	120	30	4/3	8—23
QD85-45	100	210	170	148	—	24	—/3	4-17.5	100	235	190	160	149	30	4.5/3	8-33
QD85-67	150	265	225	202	—	33	—/3	8—18	150	345	280	242	203	38	4.5/3	8-33
QD155-30	150	285	240	212	—	26	—/3	8—22	150	300	250	212	—	34	—/3	8—26
QD155-67	150	265	225	202	—	33	—/3	8—18	150	345	280	242	203	38	4.5/3	8-33
QD280-43	200	340	295	268	—	28	—/3	8—22	200	375	320	285	259	38	4.5/3	12—30
QD280-65	200	340	295	268	—	30	—/3	12—22	200	415	345	285	259	44	4.5/3	12-36
QD360-40	200	340	295	268	—	28	—/3	8—22	200	375	320	285	259	38	4.5/3	12—30
QD450-60	250	405	355	320	—	32	—/3	12—26	250	470	400	345	312	48	4.5/3	12-36
QD500-57	250	405	355	320	—	32	—/3	12—26	250	470	400	345	312	48	4.5/3	12-36
QD580-60	300	460	410	370	—	32	—/3	12—26	250	470	400	352	312	48	4.5/3	12-36
QD720-60	300	460	410	370	—	34	—/4	12—26	300	530	460	412	363	54	4.5/4	16-36