



CTT 181/A H20

Tower Installation “R”

- 1** **LOADS ON THE GROUND**
 - 1.1 CONFIGURATION “R₁”
 - 1.2 CONFIGURATION “R₂”
 - 1.2.1 Tower configuration
 - 1.2.2 Base loadings
- 2** **INSTALLATIONS “R”**
 - 2.1 PREPARING THE CONCRETE FOUNDATION
 - 2.1.1 Concrete foundation size
 - 2.1.1.1 Installation “R₁”
 - 2.1.1.2 Installation “R₂”
 - 2.2 POSITIONING THE BASE SUPPORTS
 - 2.2.1 Installation “R₁”
 - 2.2.1.1 Positioning the base plates
 - 2.2.1.2 Placing the anchor bolts
 - 2.2.1.3 Final leveling
 - 2.2.2 Installation “R₂”
 - 2.2.2.1 Positioning the expendable foundation anchors
 - 2.2.2.2 Positioning the expendable foundation anchors with jig frame HD23 22/26 (optional)
- 3** **ADDITIONAL INFORMATION**
 - 3.1 “d” DEFLECTIONS AT TOWER HEAD (“R₂”)

1

LOADS ON THE GROUND

The tables show the loads on the ground for the different crane configurations according to the hook height and to the jib range.

In-service and out-of-service base loadings consider the effects of the 2nd Order Theory and comprehend the static and dynamic uprated safety factors, as provided by FEM 1.001 standards.

Overturning moment with out-of-service crane may have minus sign, when the counterweight effect prevails that of the wind blowing from the jib rear.



The data shown herein are applicable only to the specific crane configuration indicated. Do not interpolate or extrapolate the data.



Any variation from the prescribed and recommended data and specifications could result in defective foundations and damage to or possible collapse of the crane.

The contractor is responsible for damage caused by an uncorrectly prepared foundation or by neglecting the site conditions.



As regards the tower configuration for the different crane installations, refer to **Chapter 2 “Technical Specifications”** of the crane operation manual.

TWISTING MOMENT

The twisting moment concerns in-service crane (for out-of-service crane, twisting moment is always 0) but does not consider dynamic uprated safety factor as provided by FEM 1.001 standards (table 1.1).

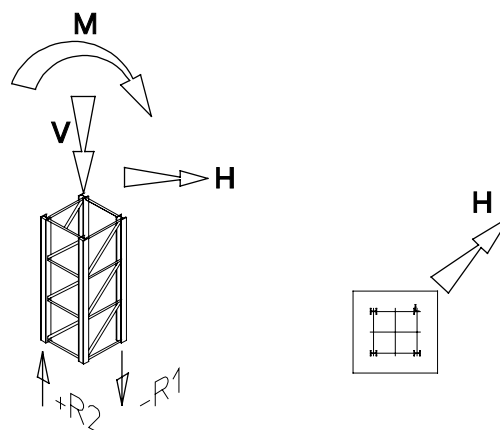
CTT 181/A	
Twisting Moment	
[kNm]	[ft/lbs]
230	170,000

Table 1.1

1.1 CONFIGURATION "R₁"

R1

- V** = Axial load
M = Overturning moment
H = Horizontal thrust (force generated by wind in the direction shown)
R₁ - R₂ = Minimum/Maximum Loads on base supports



CTT 181/A H20			Hook height 65,25 m								R1
			No. 1 H20 18.10 B + No 14 H20 18.4 tower sections								
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-1001	3	1874	-1004	504	-1001	44	3652	-1719	1219	
50-55	-1021	3	1922	-1028	518	-1021	44	3706	-1746	1235	
60-65	-1041	3	1734	-958	437	-1041	44	3524	-1678	1157	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-857	177	5925	-2597	2169	-857	-141	-7280	2714	-3143	
50-55	-887	177	6129	-2687	2243	-887	-141	-7144	2652	-3095	
60-65	-897	177	6437	-2813	2365	-897	-141	-6858	2534	-2983	
(*) DIN Standard											

(*) DIN Standard

CTT 181/A H20			Hook height 61,50 m								R1
			No. 1 H20 18.10 B + No 13 H20 18.4 tower sections								
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
	35-40-45	-971	3	1810	-971	485	-971	42	3391	-1607	1121
50-55	-991	3	1855	-994	498	-991	42	3440	-1632	1136	
60-65	-1011	3	1671	-925	419	-1011	42	3262	-1565	1059	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
	35-40-45	-829	168	5157	-2282	1867	-829	-135	-6606	2450	-2864
50-55	-859	168	5350	-2367	1937	-859	-135	-6465	2386	-2815	
60-65	-869	168	5648	-2489	2055	-869	-135	-6185	2270	-2705	
(*) DIN Standard											

(*) DIN Standard

CTT 181/A H20			Hook height 57,75 m							R1	
			No. 1 H20 18.10 B + No 12 H20 18.4 tower sections								
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
	35-40-45	-941	3	1753	-940	470	-941	40	3153	-1504	1033
50-55	-961	3	1795	-962	482	-961	40	3199	-1527	1046	
60-65	-981	3	1615	-895	404	-981	40	3023	-1461	971	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-800	160	4448	-1989	1589	-800	-128	-5986	2208	-2608	
50-55	-830	160	4632	-2071	1655	-830	-128	-5842	2142	-2557	
60-65	-840	160	4921	-2190	1769	-840	-128	-5566	2029	-2449	
(*) DIN Standard											

CTT 181/A H20			Hook height 54 m								R1
			No. 1 H20 18.10 B + No 11 H20 18.4 tower sections								
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-912	3	1701	-912	456	-912	38	2936	-1409	953	
50-55	-932	3	1742	-933	468	-932	38	2979	-1431	965	
60-65	-952	3	1565	-867	392	-952	38	2806	-1366	891	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-772	151	3792	-1718	1332	-772	-121	-5416	1985	-2371	
50-55	-802	151	3969	-1797	1396	-802	-121	-5269	1919	-2320	
60-65	-812	151	4251	-1913	1507	-812	-121	-4997	1807	-2213	
(*) DIN Standard											

CTT 181/A H20			Hook height 50,25 m								R1
			No. 1 H20 18.10 B + No 10 H20 18.4 tower sections								
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-882	3	1655	-886	445	-882	36	2738	-1322	881	
50-55	-902	3	1694	-907	456	-902	36	2779	-1343	892	
60-65	-922	3	1520	-842	381	-922	36	2607	-1279	818	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-743	143	3186	-1467	1096	-743	-114	-4891	1781	-2153	
50-55	-773	143	3356	-1543	1157	-773	-114	-4743	1714	-2101	
60-65	-783	143	3633	-1657	1265	-783	-114	-4474	1604	-1995	
(*) DIN Standard											

CTT 181/A H20			Hook height 46,50 m								R1
			No. 1 H20 18.10 B + No 9 H20 18.4 tower sections								
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-852	3	1614	-862	436	-852	35	2557	-1242	816	
50-55	-872	3	1651	-882	446	-872	35	2596	-1262	826	
60-65	-892	3	1480	-818	372	-892	35	2426	-1199	753	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-715	135	2626	-1235	877	-715	-108	-4408	1594	-1952	
50-55	-745	135	2791	-1309	936	-745	-108	-4258	1527	-1899	
60-65	-755	135	3062	-1421	1043	-755	-108	-3993	1417	-1795	
(*) DIN Standard											

(*) DIN Standard

CTT 181/A H20			Hook height 42,75 m							R1	
			No. 1 H20 18.10 B + No 8 H20 18.4 tower sections								
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-822	3	1577	-840	429	-822	33	2392	-1168	757	
50-55	-842	3	1613	-859	438	-842	33	2429	-1187	766	
60-65	-862	3	1444	-796	365	-862	33	2261	-1125	694	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-687	126	2108	-1020	676	-687	-101	-3964	1423	-1766	
50-55	-717	126	2270	-1092	734	-717	-101	-3814	1355	-1713	
60-65	-727	126	2537	-1202	839	-727	-101	-3551	1246	-1610	
(*) DIN Standard											

(*) DIN Standard

CTT 181/A H20			Hook height 39 m								R1
			No. 1 H20 18.10 B + No 7 H20 18.4 tower sections								
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-792	3	1544	-819	423	-792	31	2241	-1099	703	
50-55	-812	3	1578	-838	432	-812	31	2276	-1119	712	
60-65	-832	3	1411	-776	360	-832	31	2110	-1057	640	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-658	118	1631	-821	492	-658	-94	-3556	1266	-1595	
50-55	-688	118	1790	-892	548	-688	-94	-3406	1198	-1542	
60-65	-698	118	2053	-1000	651	-698	-94	-3145	1091	-1440	
(*) DIN Standard											

(*) DIN Standard



CTT 181/A H20			Hook height 35,25 m								R1
			No. 1 H20 18.10 B + No 6 H20 18.4 tower sections								
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-762	3	1514	-799	418	-762	29	2103	-1036	655	
50-55	-782	3	1547	-818	427	-782	29	2137	-1055	664	
60-65	-802	3	1382	-756	355	-802	29	1972	-994	592	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-630	109	1193	-637	322	-630	-87	-3183	1123	-1438	
50-55	-660	109	1349	-707	378	-660	-87	-3033	1055	-1385	
60-65	-670	109	1609	-815	480	-670	-87	-2775	949	-1283	
(*) DIN Standard											

(*) DIN Standard

CTT 181/A H20			Hook height 31,50 m								R1
			No. 1 H20 18.10 B + No 5 H20 18.4 tower sections								
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-732	3	1487	-781	415	-732	27	1977	-978	612	
50-55	-752	3	1519	-799	423	-752	27	2010	-997	620	
60-65	-772	3	1355	-738	352	-772	27	1846	-936	549	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-601	101	791	-468	168	-601	-81	-2844	993	-1294	
50-55	-631	101	945	-538	222	-631	-81	-2693	925	-1241	
60-65	-641	101	1203	-644	323	-641	-81	-2437	820	-1140	
(*) DIN Standard											

(*) DIN Standard

CTT 181/A H20			Hook height 27,75 m								R1
			No. 1 H20 18.10 B + No 4 H20 18.4 tower sections								
Jib	In-service crane										
	No wind					Tail wind 72 km/h					
[m]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-703	3	1462	-764	412	-703	25	1863	-925	574	
50-55	-723	3	1494	-782	420	-723	25	1895	-943	581	
60-65	-743	3	1331	-721	350	-743	25	1732	-882	511	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-573	93	424	-314	27	-573	-74	-2535	877	-1163	
50-55	-603	93	577	-383	81	-603	-74	-2385	808	-1110	
60-65	-613	93	833	-488	182	-613	-74	-2130	703	-1010	
(*) DIN Standard											

(*) DIN Standard



U.S. Customary units

CTT 181/A H20			Hook height 214 ft								R1
			Nr. 1 H20 18.10 B + Nr. 14 H20 18.4 tower sections								
Jib	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
115-131-148	-225013	674	1382475	-225714	113208	-225025	9915	2693377	-386405	273893	
164-180	-229509	674	1417664	-231152	116397	-229520	9917	2733235	-392415	277654	
197-213	-234004	674	1279202	-215303	98301	-234015	9915	2599427	-377136	260129	
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
115-131-148	-192671	39677	4369859	-583816	487481	-192664	-31762	-5369680	610039	-706371	
164-180	-199414	39677	4520277	-603940	504233	-199408	-31762	-5268841	595992	-695696	
197-213	-201662	39677	4747312	-632332	531501	-201655	-31762	-5058526	569650	-670478	
(*) DIN Standard											
CTT 181/A H20			Hook height 202 ft								R1
			Nr. 1 H20 18.10 B + Nr. 13 H20 18.4 tower sections								
Jib	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
115-131-148	-218304	674	1334947	-218211	109059	-218315	9485	2500741	-361115	251957	
164-180	-222799	674	1368048	-223392	111993	-222811	9485	2537428	-366735	255330	
197-213	-227295	674	1232677	-207923	94275	-227306	9485	2405604	-351701	238048	
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
115-131-148	-186281	37788	3803656	-512815	419674	-186276	-30245	-4872461	550687	-643826	
164-180	-193024	37788	3945872	-531933	435421	-193020	-30245	-4768458	536253	-632763	
197-213	-195272	37788	4165665	-559437	461801	-195267	-30245	-4561543	510328	-607962	
(*) DIN Standard											
CTT 181/A H20			Hook height 189 ft								R1
			Nr. 1 H20 18.10 B + Nr. 12 H20 18.4 tower sections								
Jib	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
115-131-148	-211595	674	1292603	-211343	105546	-211606	9056	2325475	-337954	232151	
164-180	-216090	674	1323920	-216306	108261	-216101	9056	2359513	-343250	235199	
197-213	-220585	674	1191270	-201170	90877	-220597	9056	2229548	-328443	218144	
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
115-131-148	-179891	35900	3280608	-447103	357158	-179886	-28728	-4415263	496243	-586186	
164-180	-186636	35900	3416142	-465403	372085	-186629	-28728	-4308921	481522	-574836	
197-213	-188884	35900	3629769	-492151	397709	-188877	-28728	-4105134	455980	-550418	
(*) DIN Standard											



CTT 181/A H20			Hook height 177 ft								R1
			Nr. 1 H20 18.10 B + Nr. 11 H20 18.4 tower sections								
Jib [ft]	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-204885	674	1254774	-205029	102586	-204896	8627	2165646	-316685	214236
164-180	-209381	674	1284549	-209803	105112	-209392	8627	2197472	-321710	217014	
197-213	-213876	674	1154296	-194960	88022	-213887	8624	2069232	-307114	200171	
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-173503	34012	2797041	-386231	299480	-173498	-27211	-3994514	446265	-533014
164-180	-180246	34012	2927132	-403863	313741	-180241	-27211	-3886469	431335	-521456	
197-213	-182494	34012	3135486	-429965	338718	-182489	-27211	-3685528	406142	-497387	
(*) DIN Standard											

CTT 181/A H20			Hook height 165 ft								R1
			Nr. 1 H20 18.10 B + Nr. 10 H20 18.4 tower sections								
Jib [ft]	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-198176	674	1220890	-199198	100110	-198187	8195	2019661	-297113	198019
164-180	-202671	674	1249346	-203810	102474	-202682	8195	2049635	-301911	200570	
197-213	-207167	674	1121194	-189225	85642	-207178	8195	1922974	-287509	183920	
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-167112	32122	2349866	-329820	246264	-167108	-25694	-3607214	400388	-483942
164-180	-173856	32122	2475546	-346911	259984	-173851	-25694	-3497952	385309	-472235	
197-213	-176106	32122	2679415	-372464	284411	-176099	-25694	-3299607	360435	-448484	
(*) DIN Standard											

CTT 181/A H20			Hook height 153 ft								R1
			Nr. 1 H20 18.10 B + Nr. 9 H20 18.4 tower sections								
Jib [ft]	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-191466	674	1190488	-193794	98061	-191475	7766	1886214	-279077	183339
164-180	-195962	674	1217793	-198265	100284	-195973	7766	1914632	-283685	185699	
197-213	-200457	674	1091478	-183906	83677	-200468	7766	1789402	-269458	169224	
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-160724	30234	1936515	-277555	197193	-160720	-24176	-3250862	358304	-438664
164-180	-167468	30234	2058633	-294210	210476	-167463	-24176	-3140766	343123	-426855	
197-213	-169715	30234	2258689	-319294	234437	-169711	-24176	-2944753	318534	-403390	
(*) DIN Standard											

CTT 181/A H20			Hook height 140 ft								R1
Nr. 1 H20 18.10 B + Nr. 8 H20 18.4 tower sections											
Jib [ft]	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-184757	674	1163154	-188766	96388	-184766	7337	1764192	-262443	170060
164-180	-189252	674	1189478	-193117	98491	-189261	7337	1791312	-266891	172260	
197-213	-193748	674	1064756	-178953	82079	-193759	7337	1667365	-252822	155943	
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-154334	28346	1554835	-229172	152005	-154330	-22659	-2923334	319754	-396919
164-180	-161077	28346	1674092	-245476	164937	-161073	-22659	-2812700	304507	-385043	
197-213	-163325	28346	1870932	-270166	188504	-163321	-22659	-2618773	280174	-361834	
(*) DIN Standard											

CTT 181/A H20			Hook height 128 ft								R1
			Nr. 1 H20 18.10 B + Nr. 7 H20 18.4 tower sections								
Jib [ft]	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
115-131-148	-178048	674	1138564	-184075	95051	-178057	6905	1652665	-247095	158066	
164-180	-182543	674	1164032	-188320	97049	-182552	6905	1678694	-251409	160133	
197-213	-187038	674	1040697	-174326	80807	-187050	6905	1555890	-237480	143955	
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
115-131-148	-147946	26458	1203019	-184450	110477	-147942	-21142	-2622867	284520	-358491	
164-180	-154689	26458	1320011	-200477	123132	-154685	-21142	-2511908	269233	-346576	
197-213	-156937	26458	1514122	-224832	146364	-156933	-21142	-2319825	245126	-323593	
(*) DIN Standard											

CTT 181/A H20			Hook height 116 ft								R1
Nr. 1 H20 18.10 B + Nr. 6 H20 18.4 tower sections											
Jib [ft]	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-171338	674	1116408	-179682	94012	-171347	6476	1550845	-232936	147263
164-180	-175834	674	1141160	-183840	95923	-175843	6476	1575974	-237140	149219	
197-213	-180329	674	1018998	-169989	79825	-180338	6476	1454181	-223335	133166	
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-141556	24570	879555	-143203	72425	-141552	-19625	-2347941	252418	-323194
164-180	-148299	24570	994769	-159012	84862	-148295	-19625	-2236828	237112	-311260	
197-213	-150547	24570	1186609	-183089	107815	-150542	-19625	-2046368	213204	-288475	
(*) DIN Standard											



CTT 181/A H20			Hook height 103 ft								R1
			Nr. 1 H20 18.10 B + Nr. 5 H20 18.4 tower sections								
Jib [ft]	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-164629	674	1096449	-175558	93243	-164638	6046	1458075	-219887	137568
164-180	-169124	674	1120582	-179640	95078	-169133	6046	1482459	-224000	139434	
197-213	-173620	674	999423	-165912	79102	-173629	6046	1361536	-210301	123487	
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-135168	22682	583174	-105276	37692	-135164	-18108	-2097303	223292	-290874
164-180	-141911	22682	697009	-120916	49960	-141907	-18108	-1986138	207980	-278934	
197-213	-144159	22682	886968	-144762	72683	-144154	-18108	-1797087	184245	-256322	
(*) DIN Standard											

CTT 181/A H20			Hook height 91 ft								R1
			Nr. 1 H20 18.10 B + Nr. 4 H20 18.4 tower sections								
Jib [ft]	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-157919	674	1078460	-171675	92716	-157928	5615	1373794	-207879	128915
164-180	-162415	674	1102070	-175693	94486	-162424	5615	1397558	-211916	130704	
197-213	-166910	674	981759	-162070	78614	-166919	5615	1277380	-198308	114849	
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-128778	20794	312836	-70541	6152	-128773	-16590	-1869884	197013	-261400
164-180	-135521	20794	425631	-86053	18293	-135516	-16590	-1758749	181705	-249463	
197-213	-137769	20794	614041	-109710	40826	-137764	-16590	-1570900	158117	-226999	
(*) DIN Standard											

1.2 CONFIGURATION "R₂"

R2

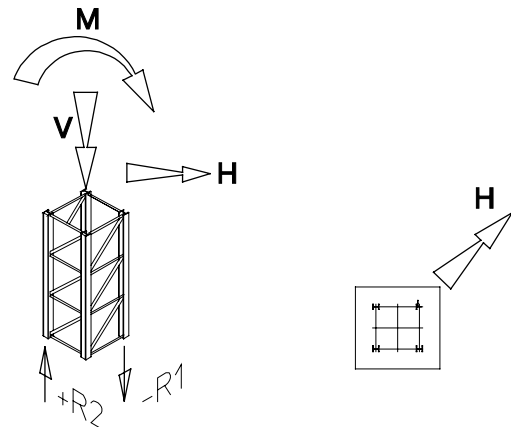
1.2.1 Tower configuration

CTT 181/A		Tower configuration			R2
Hook height		HD23 22.6	Mast section adapter HD23 → H20	H20 18.10 B	H20 18.4
[m]	[ft]				
80,25	263	3	1	1	13
74,25	244	2	1	1	13
68,25	224	1	1	1	13

Table 1.2.1

1.2.2 Base loadings

- V** = Axial load
M = Overturning moment
H = Horizontal thrust (force generated by wind in the direction shown)
R₁ - R₂ = Minimum/Maximum Loads on base supports



CTT 181/A H20			Hook height 80,25 m							R2	
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-1129	3	2034	-984	419	-1129	53	4629	-1879	1315	
50-55	-1149	3	2088	-1008	433	-1149	53	4695	-1906	1332	
60-65	-1169	3	1893	-945	361	-1169	53	4510	-1848	1263	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-979	213	9243	-3433	2944	-979	-170	-10050	3222	-3711	
50-55	-1009	213	9479	-3522	3017	-1009	-170	-9931	3173	-3678	
60-65	-1019	213	9810	-3638	3129	-1019	-170	-9639	3070	-3580	
(*) DIN Standard											

(*) DIN Standard

CTT 181/A H20			Hook height 74,25 m							R2	
Jib [m]	In-service crane										
	No wind					Tail wind 72 km/h					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-1078	3	1948	-942	403	-1078	49	4176	-1710	1171	
50-55	-1098	3	1999	-964	415	-1098	49	4235	-1735	1186	
60-65	-1118	3	1808	-903	344	-1118	49	4052	-1677	1118	
	Out-of-service crane										
	Tail wind 151 km/h					Front wind 135 km/h (*)					
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	
35-40-45	-931	199	7777	-2915	2450	-931	-159	-8809	2806	-3271	
50-55	-961	199	7994	-2998	2517	-961	-159	-8680	2754	-3234	
60-65	-971	199	8312	-3110	2624	-971	-159	-8392	2652	-3137	
(*) DIN Standard											

CTT 181/A H20			Hook height 68,25 m							R2
Jib [m]	In-service crane									
	No wind					Tail wind 72 km/h				
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]
35-40-45	-1028	3	1877	-904	391	-1028	46	3780	-1561	1047
50-55	-1048	3	1925	-926	402	-1048	46	3834	-1584	1060
60-65	-1068	3	1738	-866	332	-1068	46	3653	-1527	993
	Out-of-service crane									
	Tail wind 151 km/h					Front wind 135 km/h (*)				
	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]	V [kN]	H [kN]	M [kNm]	R1 [kN]	R2 [kN]
35-40-45	-883	184	6467	-2451	2010	-883	-147	-7705	2437	-2878
50-55	-913	184	6671	-2529	2073	-913	-147	-7569	2383	-2839
60-65	-923	184	6978	-2638	2176	-923	-147	-7285	2282	-2744
(*) DIN Standard										



For all cases not considered in the tables, consult Comedil Technical Department.



U.S. Customary units

R2

CTT 181/A H20			Hook height 263 ft							R2
Jib [ft]	In-service crane									
	No wind					Tail wind 45 mph				
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]
115-131-148	-253672	674	1500241	-221120	94285	-253685	11800	3414180	-422313	295471
164-180	-258167	674	1540379	-226464	97380	-258183	11800	3462475	-428515	299423
197-213	-262662	674	1395928	-212403	81072	-262678	11800	3326219	-415315	283976
	Out-of-service crane									
	Tail wind 94 mph					Front wind 84 mph (*)				
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]
115-131-148	-219967	47973	6817208	-771604	661620	-219958	-38245	-7412780	724228	-834207
164-180	-226710	47973	6990977	-791556	678201	-226701	-38245	-7324642	713277	-826628
197-213	-228958	47973	7235117	-817781	703302	-228949	-38245	-7109437	690093	-804568
(*) DIN Standard										

CTT 181/A H20			Hook height 244 ft							R2
Jib [ft]	In-service crane									
	No wind					Tail wind 45 mph				
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]
	115-131-148	-242343	674	1437062	-211647	90475	-242357	11059	3079844	-384337
164-180	-246839	674	1474346	-216690	93271	-246852	11059	3123264	-390025	266599
197-213	-251334	674	1333494	-203008	77341	-251348	11059	2988556	-376988	251314
	Out-of-service crane									
	Tail wind 94 mph					Front wind 84 mph (*)				
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]
	115-131-148	-209176	44709	5736270	-655280	550692	-209169	-35682	-6497159	630677
164-180	-215921	44709	5896416	-673800	565840	-215912	-35682	-6401866	618974	-726930
197-213	-218169	44709	6130488	-698968	589883	-218160	-35682	-6189677	596107	-705187
(*) DIN Standard										

CTT 181/A H20			Hook height 224 ft							R2	
Jib [ft]	In-service crane										
	No wind					Tail wind 45 mph					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-231015	674	1384533	-203293	87786	-231028	10315	2787756	-350801	235287
	164-180	-235510	674	1419604	-208104	90349	-235524	10315	2827532	-356106	238344
	197-213	-240006	674	1281643	-194725	74723	-240019	10315	2694262	-343221	223211
	Out-of-service crane										
	Tail wind 94 mph					Front wind 84 mph (*)					
	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	V [lbs]	H [lbs]	M [lbs.ft]	R1 [lbs]	R2 [lbs]	
	115-131-148	-198387	41445	4770140	-551025	451831	-198380	-33120	-5683151	547807	-646997
	164-180	-205130	41445	4920373	-568503	465938	-205123	-33120	-5582931	535586	-638148
	197-213	-207380	41445	5146753	-592862	489172	-207371	-33120	-5373420	513001	-616686
(*) DIN Standard											

2

INSTALLATION “R”

Comedil just provides some general requirements concerning the dimensions of the supports. The actual dimensions shall be calculated by the customer according to the loads transmitted by the crane on the supports and the bearing capacity of the ground.

2.1 PREPARING THE CONCRETE FOUNDATION

The dimensions of the concrete foundation must be calculated by the designer engineer responsible for the concrete works, who shall refer to the load values indicated in the tables (para. 1) and to the ground resistance values measured.

The procedure to calculate the concrete foundation dimensions is as follows:

Assuming $e = \frac{M + (H \times h)}{V + P} \leq \frac{L}{3}$ where:

M	= Overturning moment
H	= Horizontal thrust
h	= Concrete foundation height
V	= Axial load
P	= Concrete foundation weight

P	= $L^2 \times h \times \rho$
L	= Concrete foundation side
ρ	$\cong 24 \text{ kN/m}^3 \text{ (150 lbs/ft}^3\text{)}$
f	= Friction factor (ground/concrete)

Two situations can ensue from this relation:

$$1) \quad e > \frac{L}{6} \quad \sigma = \frac{2}{3} \times \frac{V + P}{L \times [(L/2) - e]}$$

$$2) \quad e \leq \frac{L}{6} \quad \sigma = \frac{V + P}{L^2} \times [1 + (6 \times e)/L]$$

Simultaneously check the following conditions:

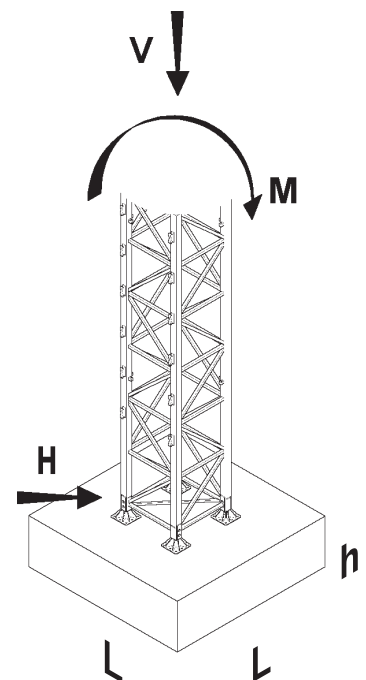
a) $\sigma \leq \sigma_{\text{allowed by the ground}}$

b) $H < \frac{f}{1.3} \times (V + P) \quad \text{where } f = 0.5 - 0.8$

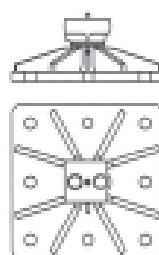


Note: “**R1**” installation (H20 tower) provides recuperable foundation plates as base support (picture 2.1.1):

“**R2**” configuration (H20/HD23 tower) provides instead expendable foundation anchors (picture 2.1.2)



Picture 2.1.1



Picture 2.1.2



σ'' possible pressures (kg/cm² - lbs/in².) for superficial foundations (DIN 1054)

a) Recent deposits:

Slip - Muds - Fine sand aggregate - Peat 0 (0')

b) Loose/Unstable ground:

	Fine and middle sand				Coarse sand - Gravel			
	For the smallest dimension of foundation measuring [m]							
for foundations deep	0.4	1.0	5.0	10.0	0.4	1.0	5.0	10.0
up to 0.5 m	1.2	1.5	2.0	2.5	1.5	2.5	3.0	4.0
from 0.5 to 1.0 m	1.5	2.5	3.0	4.0	2.0	3.0	4.0	5.0
from 1.0 to 2.0 m	2.0	3.0	4.0	5.0	2.5	3.5	5.0	6.0



U.S. Customary Units

b) Loose/Unstable ground:

	Fine and middle sand				Coarse sand - Gravel			
	For the smallest dimension of foundation measuring [ft]							
for foundations deep	1'4"	3'3"	16'5"	32'10"	1'4"	3'3"	16'5"	32'10"
up to 1'8"	17.1	21.3	28.4	35.6	21.3	35.6	42.7	56.9
from 1'8" to 3'3"	21.3	35.6	42.7	56.9	28.4	42.7	56.9	71.1
from 3'3" to 6'7"	28.4	42.7	56.9	71.1	35.6	49.8	71.1	85.3

c) Solid/Stable ground:

Slip-Plastic clay 0.4 (5.7)
Solid-Plastic clay 1.0 (14.2)
Half-solid clay 1.5 (21.3)
Solid clay 3.0 (42.7)

d) **Unfissured rock** (1/5 of ultimate compressive stress) from 10 (142) to 30 (427)

e) **Tufa - Solid pozzuolana** 3 - 5 (42.7 - 71.1)

1 kg/cm² \cong 100 kN/m² (14.22 lbs/in².)

GENERAL PRESCRIPTIONS

Materials

Lean: 200 kg/m³ concrete

Concrete foundation: Rck concrete – 300 Grade

Gagger: FeB4k iron - σ_{allowed} allowed 260 N/mm²

PREPARATION

Concrete:

It shall be "Portland 325" type with proper grain size and water-cement ratio ≤ 0.45 . Reinforced concrete structures shall be kept moist for at least 3 days after casting.

Reinforcement bars:

The distance between the concrete bed outer edge and the bar's upper edge shall be of at least 2 cm / 0.8 inch (also for brackets).

The distance between the gagers shall be at least double the diameter of the bar with the biggest cross-section and, anyhow, not lower than 3 cm / 1.2 inch.

2.1.1 Concrete foundation size



The design dimensions given for the concrete foundation satisfy the standards stability requirements. They prevent the crane from overturning, apart from the ground own resistance.



Case "**A**" = minimum foundation size according to **FEM standard**

The standard insures the out-of-service crane stability with wind blowing from the counterjib rear (tail wind) at a speed of 151km/h (94 mph), in the event that the crane is left free to weathervane, as prescribed in the standard.



Case "**B**" = optional foundation size according to **DIN** and **TÜV standard** (recommended by the manufacturer)

The standard insures the out-of-service crane stability with wind blowing in front of jib point (front wind) at a speed of 135km/h (84 mph), in the event that the crane is accidentally prevented from weathervaning.

2.1.1.1 Installation "R₁"

Refer, then, to tables 2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.1.5, 2.1.6, 2.1.7, 2.1.8, 2.1.9, 2.1.10 and 2.1.11, all considering a concrete foundation height of 1.5 m (5 ft) and $e \leq \frac{L}{6}$ relation.



For heights other than the design one (but never less than 1.3 m / 4 ft), consult the Manufacturer.

L = foundation minimum side

H = foundation minimum height

Z = concrete foundation weight

σ = maximum pressure on the ground

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib	Hook height 65,25 m				No. 1 H20 18.10 B + No. 14 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	7,1	1,5	181	210	7,6	1,5	208	213
50-55	7,2	1,5	187	206	7,5	1,5	203	219
60-65	7,3	1,5	192	209	7,4	1,5	197	216

Table 2.1.1

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib	Hook height 61,50 m				No. 1 H20 18.10 B + No. 13 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	6,8	1,5	166	205	7,4	1,5	197	205
50-55	6,9	1,5	171	201	7,3	1,5	192	210
60-65	7,0	1,5	176	205	7,2	1,5	187	206

Table 2.1.2

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib	Hook height 57,75 m				No. 1 H20 18.10 B + No. 12 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	6,5	1,5	152	199	7,1	1,5	181	214
50-55	6,6	1,5	157	196	7,1	1,5	181	202
60-65	6,7	1,5	162	201	7,0	1,5	176	198

Table 2.1.3

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [m]	Hook height 54 m				No. 1 H20 18.10 B + No. 11 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	6,1	1,5	134	207	6,9	1,5	171	207
50-55	6,2	1,5	138	205	6,8	1,5	166	210
60-65	6,3	1,5	143	212	6,7	1,5	162	204

Table 2.1.4

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [m]	Hook height 50,25 m				No. 1 H20 18.10 B + No. 10 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	5,8	1,5	121	199	6,7	1,5	162	201
50-55	5,9	1,5	125	198	6,6	1,5	157	203
60-65	6,0	1,5	130	206	6,5	1,5	152	197

Table 2.1.5

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [m]	Hook height 46,50 m				No. 1 H20 18.10 B + No. 9 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	5,7	1,5	117	167	6,4	1,5	147	211
50-55	5,7	1,5	117	178	6,3	1,5	143	212
60-65	5,7	1,5	117	200	6,2	1,5	138	204

Table 2.1.6

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [m]	Hook height 42,75 m				No. 1 H20 18.10 B + No. 8 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	5,5	1,5	109	160	6,2	1,5	138	206
50-55	5,5	1,5	109	162	6,1	1,5	134	206
60-65	5,5	1,5	109	180	6,0	1,5	130	197

Table 2.1.7

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [m]	Hook height 39 m				No. 1 H20 18.10 B + No. 7 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	5,4	1,5	105	159	6,0	1,5	130	202
50-55	5,4	1,5	105	161	5,9	1,5	125	201
60-65	5,4	1,5	105	154	5,8	1,5	121	191

Table 2.1.8

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [m]	Hook height 35,25 m				No. 1 H20 18.10 B + No. 6 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	5,3	1,5	101	158	5,8	1,5	121	198
50-55	5,3	1,5	101	160	5,7	1,5	117	196
60-65	5,3	1,5	101	151	5,5	1,5	109	199

Table 2.1.9

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [m]	Hook height 31,50 m				No. 1 H20 18.10 B + No. 5 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	5,2	1,5	97	157	5,5	1,5	109	212
50-55	5,2	1,5	97	159	5,4	1,5	105	208
60-65	5,2	1,5	97	150	5,2	1,5	97	209

Table 2.1.10

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [m]	Hook height 27,75 m				No. 1 H20 18.10 B + No. 4 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	5,1	1,5	94	157	5,3	1,5	101	209
50-55	5,1	1,5	94	159	5,2	1,5	97	204
60-65	5,1	1,5	94	149	5,0	1,5	90	203

Table 2.1.11

**U.S. Customary Units**

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [ft]	Hook height 214 ft				No. 1 H20 18.10 B + No. 14 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]
115-131-148	23	5	400155	4385	25	5	458499	4447
164-180	24	5	411506	4301	25	5	446513	4573
197-213	24	5	423016	4364	24	5	434685	4510

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [ft]	Hook height 202 ft				No. 1 H20 18.10 B + No. 13 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]
115-131-148	22	5	367053	4280	24	5	434685	4280
164-180	23	5	377928	4197	24	5	423016	4385
197-213	23	5	388962	4280	24	5	411506	4301

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [ft]	Hook height 189 ft				No. 1 H20 18.10 B + No. 12 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]
115-131-148	21	5	335381	4155	23	5	400155	4468
164-180	22	5	345779	4092	23	5	400155	4218
197-213	22	5	356337	4197	23	5	388962	4134

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [ft]	Hook height 177 ft				No. 1 H20 18.10 B + No. 11 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]
115-131-148	20	5	295373	4322	23	5	377928	4322
164-180	20	5	305137	4280	22	5	367053	4385
197-213	21	5	315059	4427	22	5	356337	4260

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [ft]	Hook height 165 ft				No. 1 H20 18.10 B + No. 10 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]
115-131-148	19	5	267034	4155	22	5	356337	4197
164-180	19	5	276322	4134	22	5	345779	4239
197-213	20	5	285768	4301	21	5	335381	4113

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [ft]	Hook height 153 ft				No. 1 H20 18.10 B + No. 9 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]
115-131-148	19	5	257906	3487	21	5	325140	4406
164-180	19	5	257906	3717	21	5	315059	4427
197-213	19	5	257906	4176	20	5	305137	4260

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [ft]	Hook height 140 ft				No. 1 H20 18.10 B + No. 8 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]
115-131-148	18	5	240125	3341	20	5	305137	4301
164-180	18	5	240125	3383	20	5	295373	4301
197-213	18	5	240125	3758	20	5	285768	4113

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [ft]	Hook height 128 ft				No. 1 H20 18.10 B + No. 7 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]
115-131-148	18	5	231472	3320	20	5	285768	4218
164-180	18	5	231472	3362	19	5	276322	4197
197-213	18	5	231472	3216	19	5	267034	3988

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [ft]	Hook height 116 ft				No. 1 H20 18.10 B + No. 6 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]
115-131-148	18	5	231472	3320	20	5	285768	4218
164-180	18	5	231472	3362	19	5	276322	4197
197-213	18	5	231472	3216	19	5	267034	3988

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [ft]	Hook height 103 ft				No. 1 H20 18.10 B + No. 5 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]
115-131-148	17	5	214644	3278	18	5	240125	4427
164-180	17	5	214644	3320	18	5	231472	4343
197-213	17	5	214644	3132	17	5	214644	4364

Concrete foundation minimum size								
CTT 181/A H20								R1
Jib [ft]	Hook height 91 ft				No. 1 H20 18.10 B + No. 4 H20 18.4 tower sections			
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]	L [ft]	H [ft]	Z [lbs]	σ [lbs/ft ²]
115-131-148	17	5	206467	3278	17	5	222978	4364
164-180	17	5	206467	3320	17	5	214644	4260
197-213	17	5	206467	3111	16	5	198450	4239

2.1.1.2 Installation "R₂"

Refer to table 1.2.1 (tower configuration).

For different concrete foundation heights, consult the Manufacturer.



L1 = Recommended minimum concrete foundation side with $\sigma_{\text{ground}} \simeq 140 \text{ kN/m}^2$ (2929 lbs/ft²)

σ_1 = Ground pressure (concrete foundation - L1 side)

L2 = Recommended minimum concrete foundation side with $\sigma_{\text{ground}} \simeq 100 \text{ kN/m}^2$ (2088 lbs/ft²)

σ_2 = Ground pressure (concrete foundation - L2 side)

H = Concrete foundation minimum height

Concrete foundation minimum size								
CTT 181/A H20								R2
Jib [m]	Hook height 80,25 m							
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	8,5	1,7	295	175	8,5	1,7	295	196
50-55	8,5	1,7	295	181	8,5	1,7	295	191
60-65	8,5	1,7	295	190	8,5	1,7	295	183

Table 2.1.12

Concrete foundation minimum size								
CTT 181/A H20								R2
Jib [m]	Hook height 74,25 m							
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	8,1	1,7	268	169	8,1	1,7	268	199
50-55	8,1	1,7	268	174	8,1	1,7	268	194
60-65	8,1	1,7	268	183	8,1	1,7	268	184

Table 2.1.13

Concrete foundation minimum size								
CTT 181/A H20								R2
Jib [m]	Hook height 68,25 m							
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
35-40-45	7,8	1,7	248	156	7,8	1,7	248	192
50-55	7,8	1,7	248	161	7,8	1,7	248	186
60-65	7,8	1,7	248	169	7,8	1,7	248	177

Table 2.1.14

**U.S. Customary Units**

Concrete foundation minimum size								
CTT 181/A H20								R2
Jib	Hook height 263 ft							
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
115-131-148	28	6	649990	3654	28	6	649990	4092
164-180	28	6	649990	3779	28	6	649990	3988
197-213	28	6	649990	3967	28	6	649990	3821

Concrete foundation minimum size								
CTT 181/A H20								R2
Jib	Hook height 244 ft							
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
115-131-148	27	6	590254	3529	27	6	590254	4155
164-180	27	6	590254	3633	27	6	590254	4051
197-213	27	6	590254	3821	27	6	590254	3842

Concrete foundation minimum size								
CTT 181/A H20								R2
Jib	Hook height 224 ft							
	Case A) FEM standard				Case B) DIN/TÜV standard			
	L [m]	H [m]	Z [t]	σ [kN/m ²]	L [m]	H [m]	Z [t]	σ [kN/m ²]
115-131-148	26	6	547341	3257	26	6	547341	4009
164-180	26	6	547341	3362	26	6	547341	3884
197-213	26	6	547341	3529	26	6	547341	3696

2.2 POSITIONING THE BASE SUPPORTS

2.2.1 Installation “R₁”

2.2.1.1 Positioning the base plates

After excavating the foundation pit and assembling the reinforcement mesh cage of the footing, position the base plates or the jig frame for recuperable foundation plates in the centre of the upper surface of the armature itself (picture 2.2.1).

Shim and level the base plates until they are positioned perfectly on the upper surface of the footing.

Dimensions are expressed in millimeters [1 mm = 0.03937 in.]

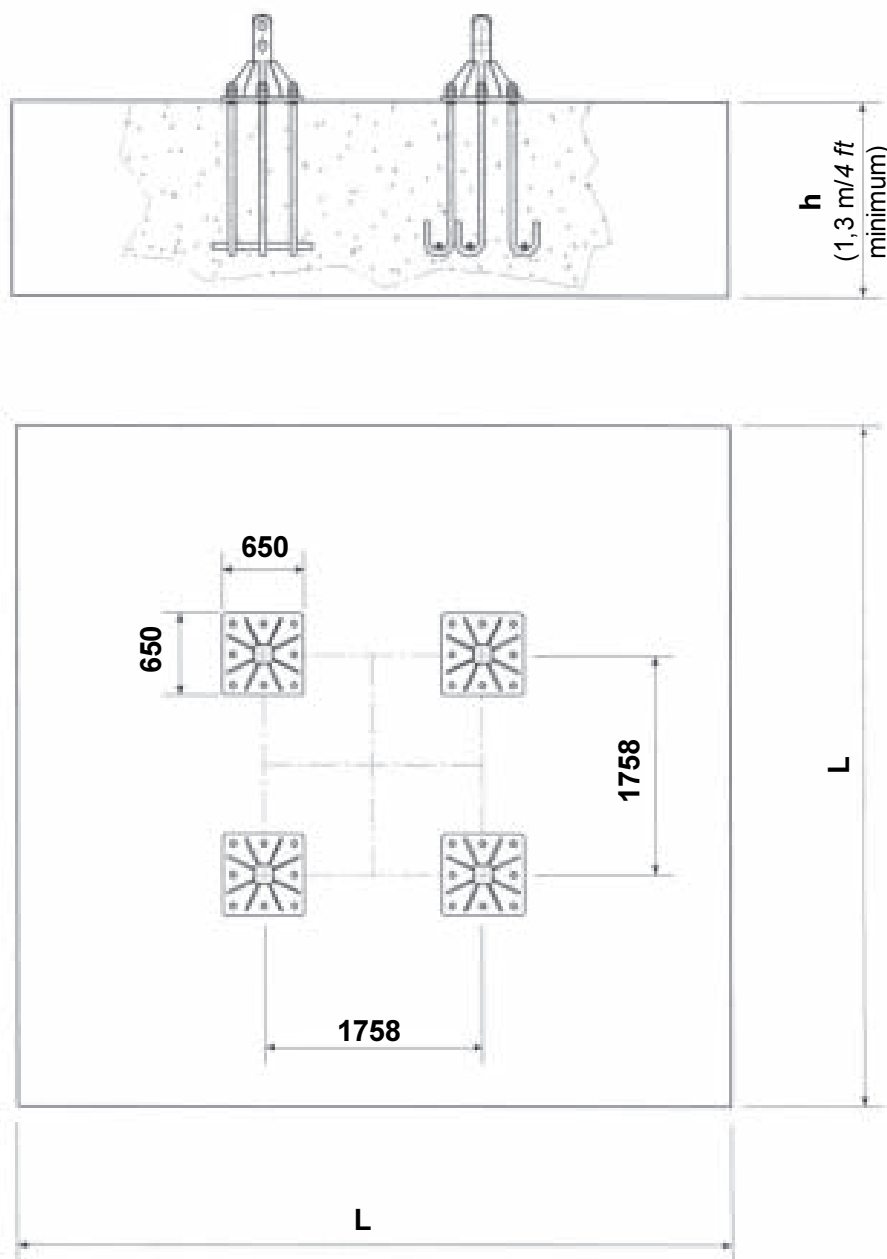


Fig. 2.2.1

2.2.1.2 Placing the anchor bolts

CTT 181/A H20					R1
M45 Anchor Bolts L=1380 mm					
Mast section H20 18.10 B	Mast section H20 18.4	Hook height		Anchor bolts/each plate	Total M45 anchor bolts
[no]	[no]	[m]	[ft]	[no]	[no]
1	14	65,25	214	8	32
1	13	61,50	202	8	32
1	12	57,75	189	8	32
1	11	54	177	8	32
1	10	50,25	165	8	32
1	9	46,50	153	6	24
1	8	42,75	140	6	24
1	7	39	128	6	24
1	6	35,25	116	6	24
1	5	31,50	103	6	24
1	4	27,75	91	6	24
1	3	24	79	4	16
1	2	20,25	66	4	16
1	2	16,5	54	4	16

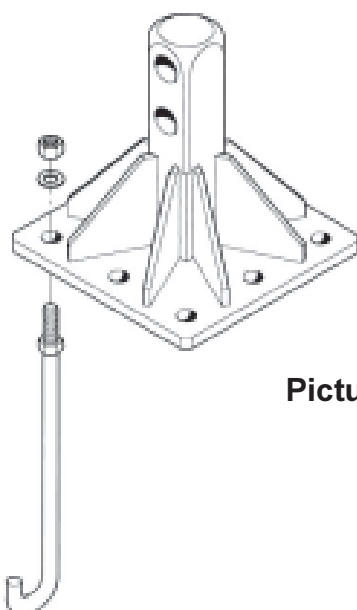
Table 2.2.1

Screw down flat nut M45 **(1)** on the anchor bolt until there is 137 mm (5,4 in) clearance between the base plate bottom and the anchor bolt head (picture 2.2.2).

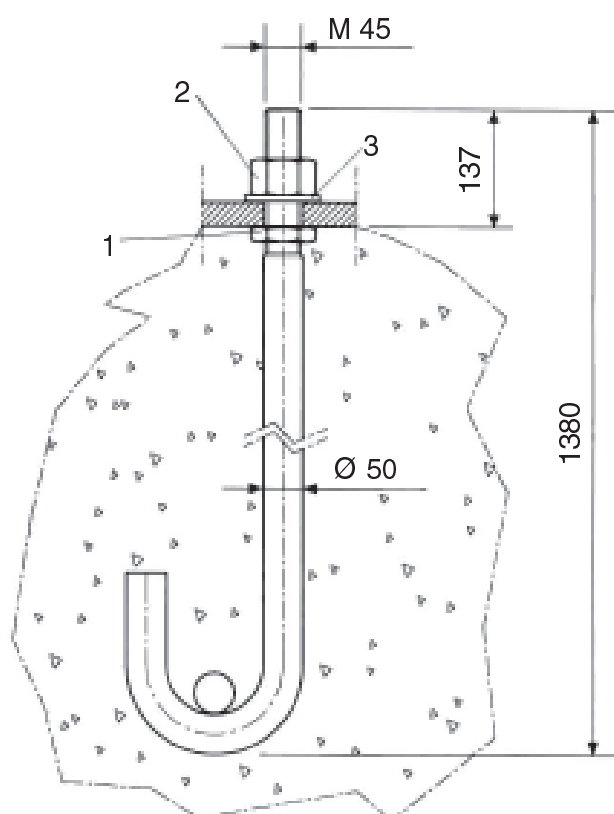
Place the anchor bolt in the hole of the plate.

Position washer **(3)** and screw tall nut M45

Now the anchor bolts stay at right angle about the surface of the base plate.



Picture 2.2.2



Dimensions are expressed in millimeters

Connect the anchor bolts with Ø 30 steel iron bars (pictures 2.2.3 and 2.2.4).

Weld or connect the anchor bolts to the reinforcement mesh cage.

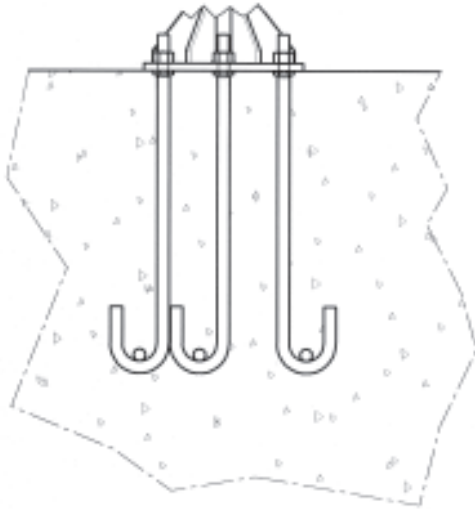
Remove the shims used for leveling.

Check the base plates for proper level.

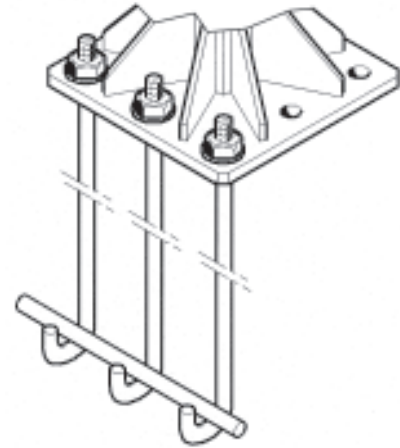


Tower should be installed level to a tolerance of 1 : 500 (*about 1 in. in 40 ft*).

In case of deviation from the above value, contact Comedil Engineering Department.



Picture 2.2.3



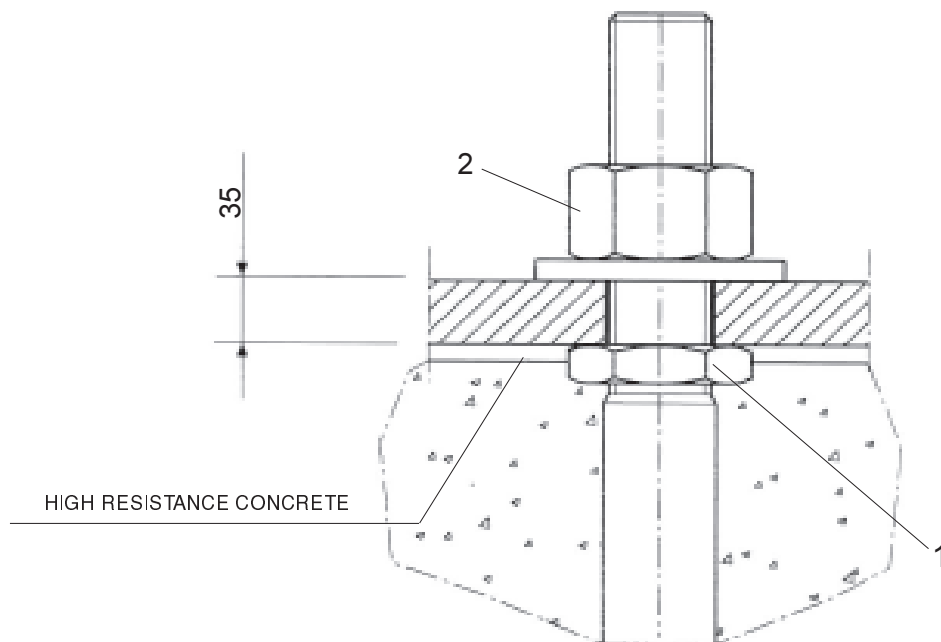
Picture 2.2.4

Secure nuts **(2)** with lock nuts M45, thus preventing them from loosening (picture 2.2.5).

To correct any leveling error, rotate nuts **(1)** and **(2)** (picture 2.2.5).

Pour the concrete.

Inspect the concrete three days after pouring and, if necessary, use high-resistance concrete for the final leveling of the base plates.



Picture 2.2.5

2.2.1.3 *Final leveling*

To correct any leveling error, remove the lock nuts and tall nuts. Then place shims where necessary. Screw tall nuts down to the plate without tightening them firmly.

Fill the empty spaces between the concrete slab and the base plates with high-resistance concrete.

On completing the crane erection, screw the tall nuts firmly and secure them with lock nuts.



Torque wrench setting for anchor bolts is 1850 Nm (1,364 lbs ft).

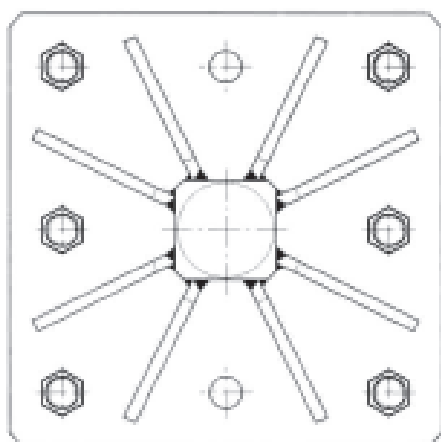


Be sure that, once completed the crane erection and during the crane whole working period, the part of the anchor bolts jutting out of the concrete foundation is always clean from deposits, earth or mud and that it does not stay into the water for a long time.

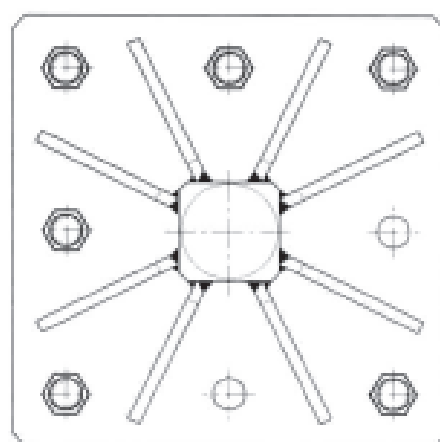


The anchor bolts shall always be even-numbered and symmetric about one of the axes.

YES



NO

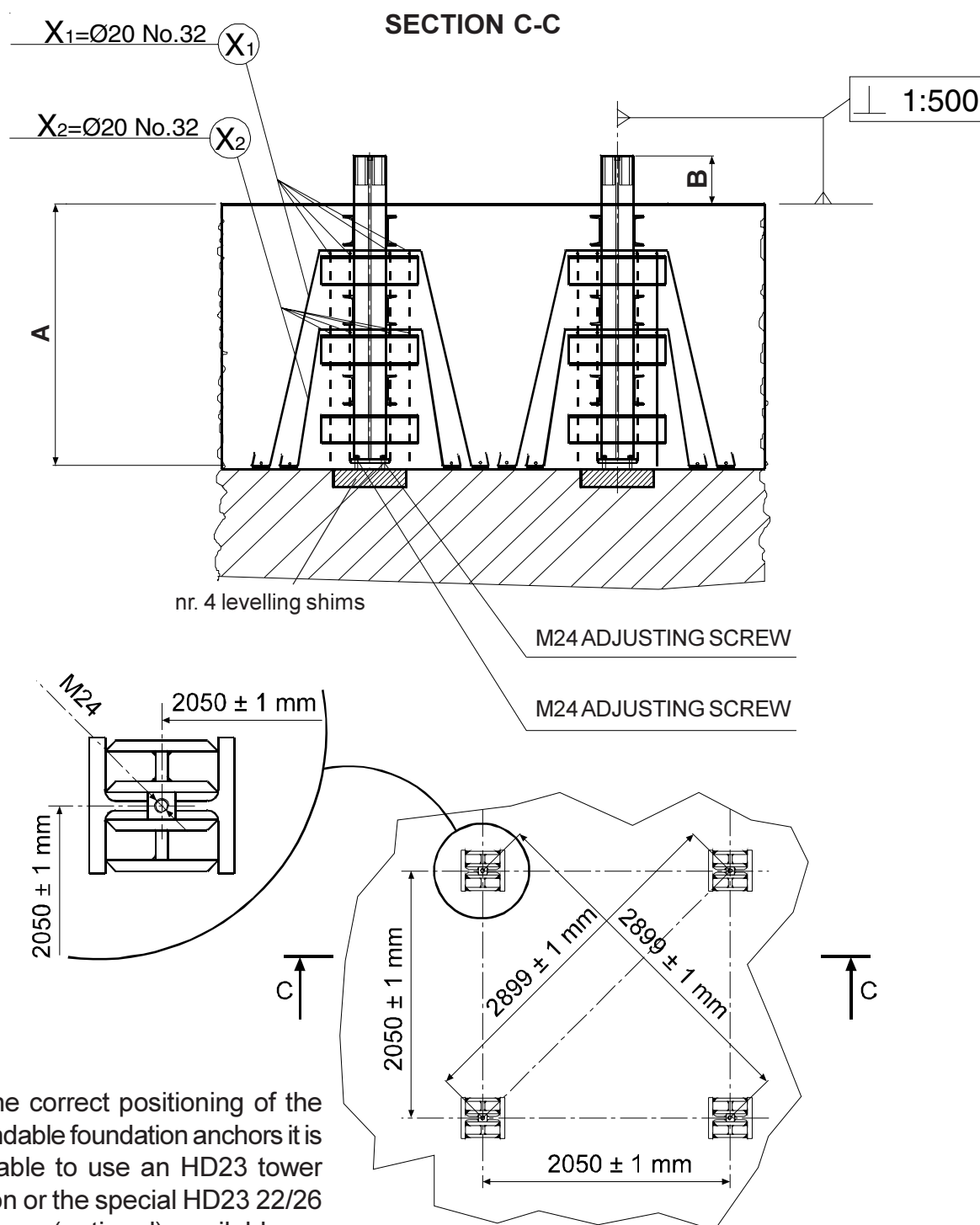


2.2.2 Installation "R₂"

2.2.2.1 Positioning the expendable foundation anchors

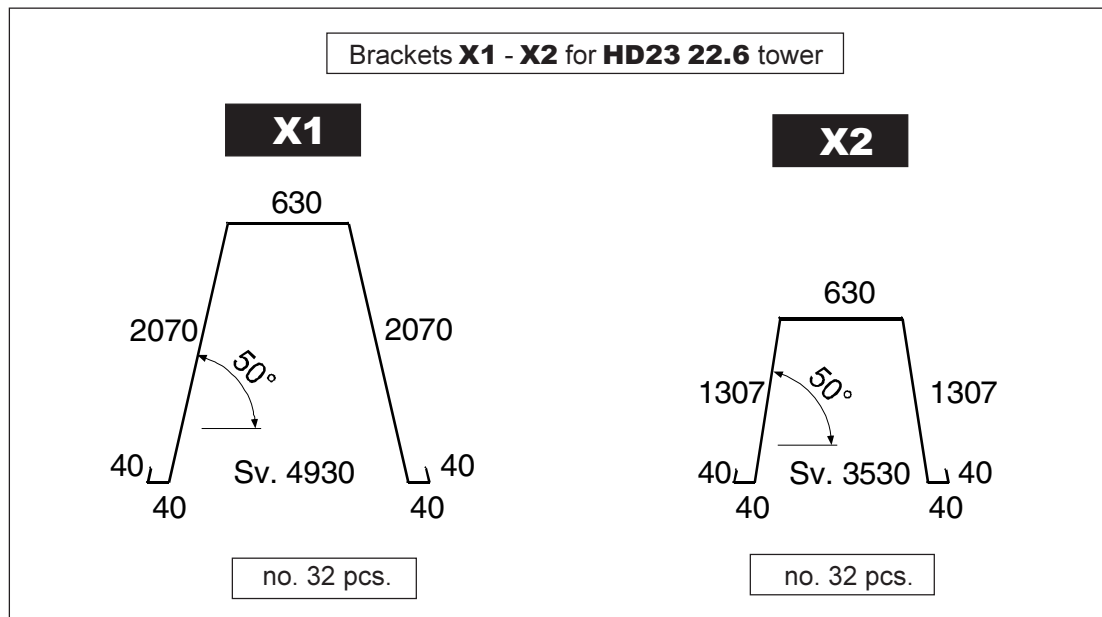
After excavating the foundation pit, position the expendable foundation anchors on the four level shims (picture 2.2.6). Then place the reinforcement mesh cage of the footing.

for HD23 22 tower	A =	1700 mm
	B =	370 mm



For the correct positioning of the expendable foundation anchors it is advisable to use an HD23 tower section or the special HD23 22/26 jig frame (optional) available on request (para. 2.2.2.2).

Picture 2.2.6



Dimensions are expressed in millimeters [1 mm = 0.03937 in.]

Picture 2.2.7

Tower should be installed level to a tolerance of 1 : 500 (*about 1 inch in 40 ft*).

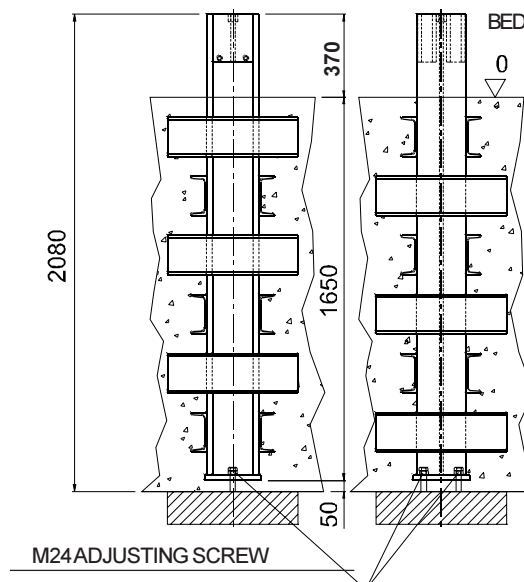


In case of deviation from the above value, contact Comedil Engineering Department.

To correct any leveling error adjust the M24 adjusting screw placed on the expendable foundation anchors (picture 2.2.8).

After levelling, tighten M24 adjusting screw before completing the reinforcement and pouring in the concrete.

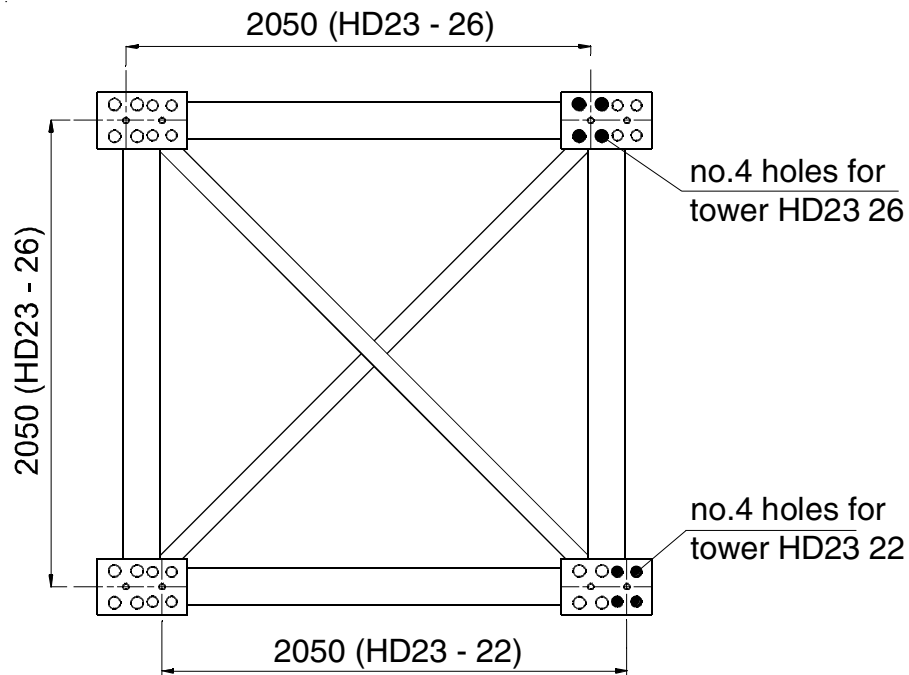
HD23 22



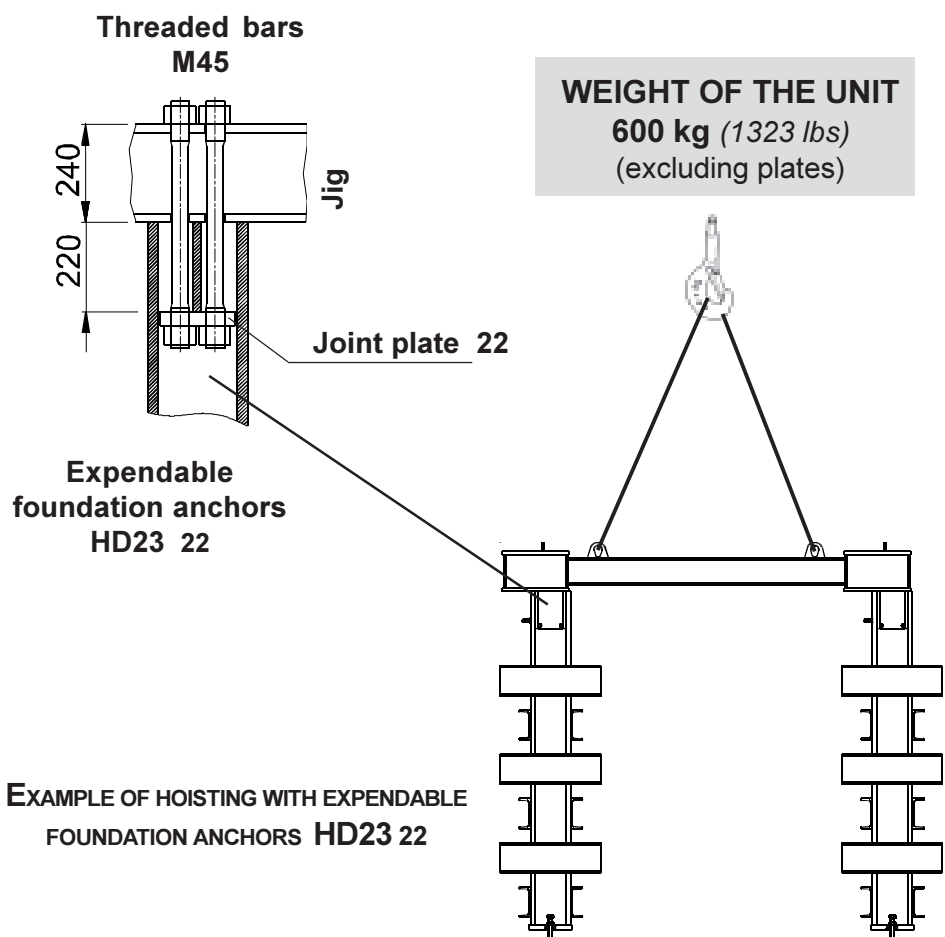
Picture 2.2.8

2.2.2.2 Positioning the expendable foundation anchors with jig frame HD23 22/26 (optional)

For a correct positioning of the expendable foundation anchors use jig frame HD23 22/26 (picture 2.2.9). Having placed the four expendable foundation anchors lift and secure the jig frame to the foundation anchors in the proper holes prepared for the different tower configurations to be assembled (picture 2.2.9) and using the proper threaded bars with relative nuts and joint plates (picture 2.2.10).



Picture 2.2.9



Picture 2.2.10

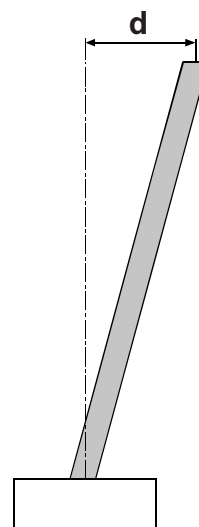
3

ADDITIONAL INFORMATION

3.1 “d” DEFLECTIONS AT THE **R2** TOWER TOP

d1 = in-service crane

d2 = out-of-service crane



CTT 181/A	Deflections at tower head	
R2	H20/HD23 Tower	
Hook height	d1	d2
[m]	[cm]	[cm]
80,25	110	190
74,25	90	150
68,25	80	120

Table 3.1.1



U.S. Customary Unit

CTT 181/A	Deflections at tower head	
R2	H20/HD23 Tower	
Hook height	d1	d2
[ft]	[inches]	[inches]
263	43	75
244	35	59
224	31	47