

CTT 181/A

Counterweights

1	COUNTERWEIGHTS
1.1	PREPARATION
1.2	TYPE AND QUANTITY
1.3	WORKING DRAWINGS
1.3.1	Counterweight " A " (3.5 t / 7700 lbs) - Code 390107011
1.3.2	Counterweight " B " (0.8 t / 1750 lbs) - Code 390107012

1 COUNTERWEIGHTS

1.1 PREPARATION

The preparation of the ballast blocks must be carried out with maximum precision. They can be installed once they have been cured and the exact weight has been established.



The weight of the counterweights shall be within a tolerance of $\pm 2\%$.

The manufacturing material shall have the following features:

- concrete grade Rck 300
- Fe B 44 K steel reinforcement
- 40°x45° max. external corners

1.2 TYPE AND QUANTITY

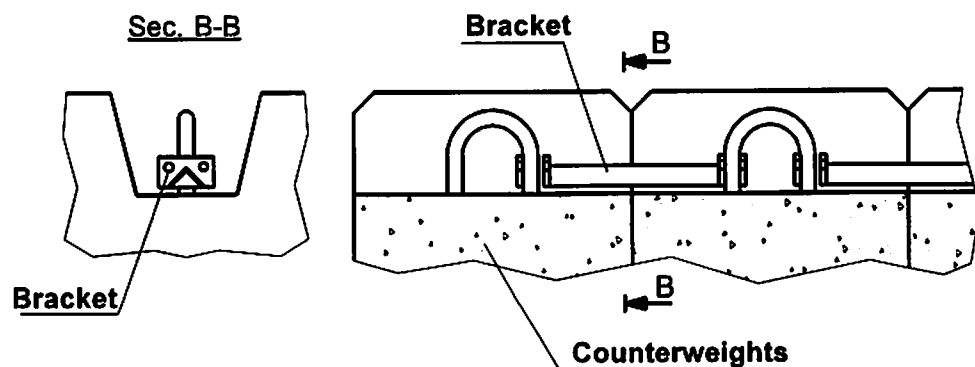


Position on the counterjib the exact ballast quantity shown in the following tables, which varies according to the jib length.

BLOCK TYPE	BLOCK WEIGHT	
	t	lbs
"A"	3.5	7718
"B"	0.8	1764

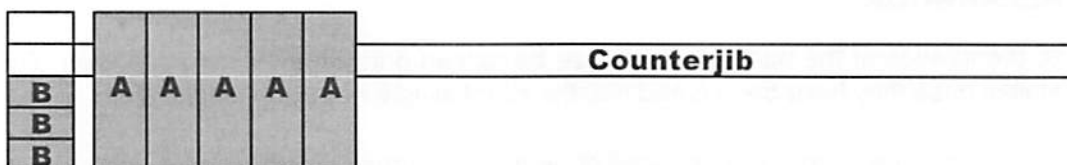


If the chosen configuration does not need any counterweights "A" on the side of the mobile ballast basket, Comedil supplies a special bracket to stop the "A" blocks installed in the proper position (one every two blocks) (picture 1.2.1).



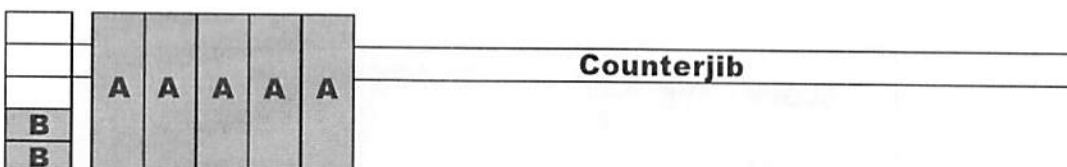
Picture 1.2.1

65 m (213 ft) and 60 m (197 ft) jib



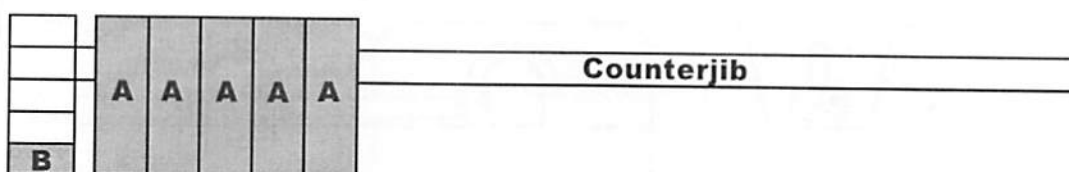
	Quantity	t	lbs
Counterweight "A"	5	17.5	38590
Counterweight "B"	3	2.4	5292
Total weight		19.9	43882

55 m (180 ft) jib



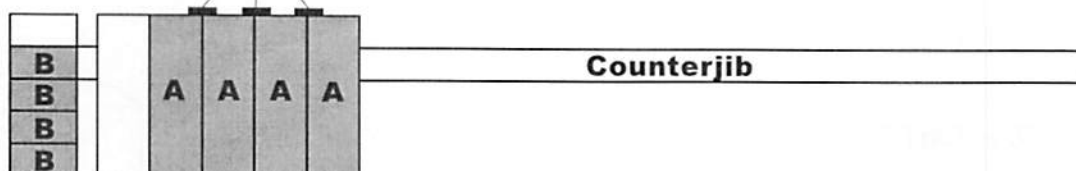
	Quantity	t	lbs
Counterweight "A"	5	17.5	38590
Counterweight "B"	2	1.6	3528
Total weight		19.1	42118

50 m (164 ft) jib

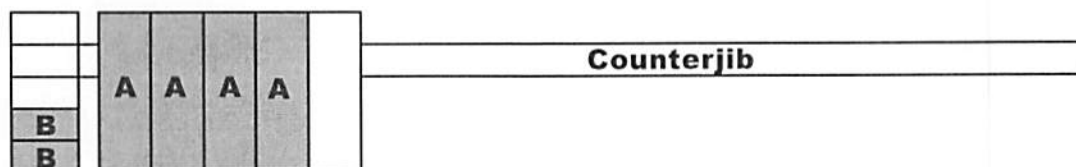


	Quantity	t	lbs
Counterweight "A"	5	17.5	38590
Counterweight "B"	1	0.8	1764
Total weight		18.3	40354

no. 3 special brackets

45 m (148 ft) jib

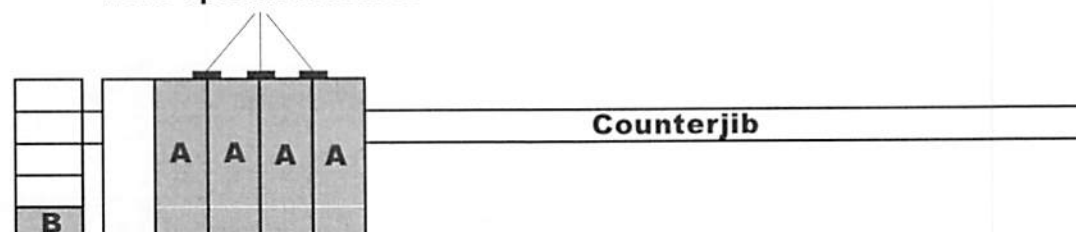
	Quantity	t	lbs
Counterweight "A"	4	14	30872
Counterweight "B"	4	3.2	7056
Total weight		17.2	37928

40 m (131 ft) jib

	Quantity	t	lbs
Counterweight "A"	4	14	30872
Counterweight "B"	2	1.6	3528
Total weight		15.6	34400

35 m (115 ft) jib

no. 3 special brackets



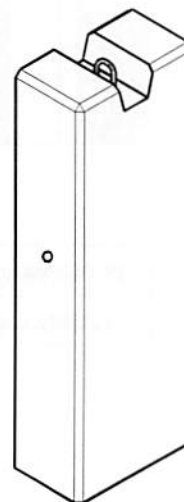
	Quantity	t	lbs
Counterweight "A"	4	14	30872
Counterweight "B"	1	0.8	1764
Total weight		14.8	32636

1.3 WORKING DRAWINGS

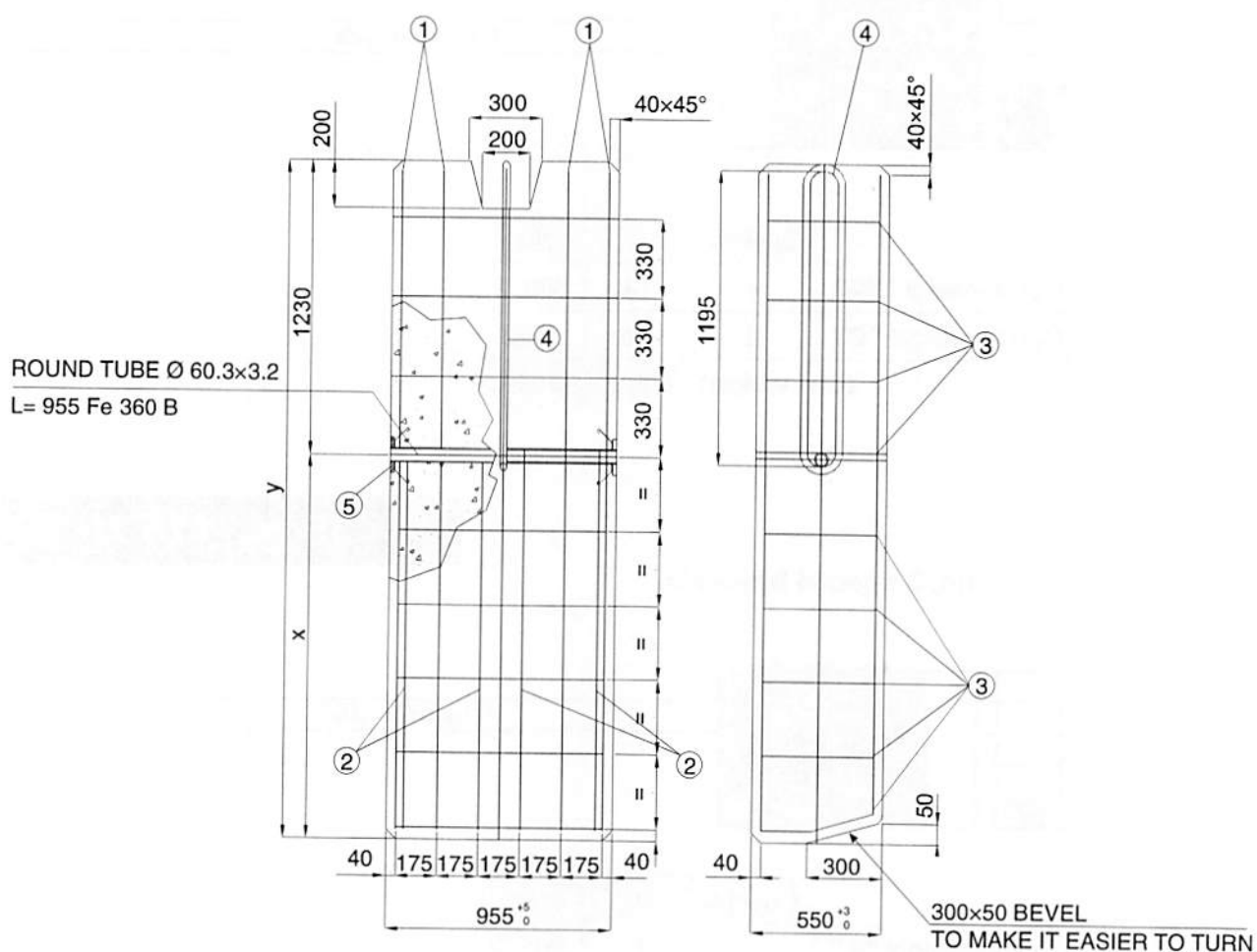
1.3.1 Counterweight "A" (3.5 t / 7718 lbs) - Code 390107011

A

R.C. Total Specific Weight		X		Y	
[kg/m ³]	[lbs/ft ³]	[mm]	[in.]	[mm]	[in.]
2300	144	1720	68	2950	116
2400	150	1600	63	2830	111
2500	156	1490	59	2720	107



SEC. A-A

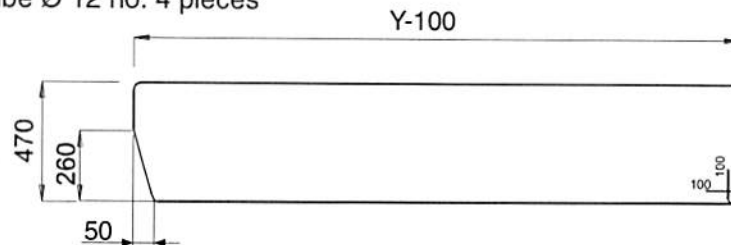


Dimensions are expressed in millimeters [1 mm = 0.03937 in.]

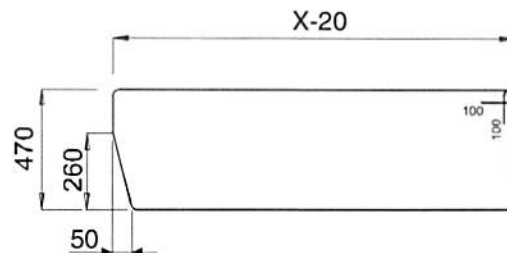
Reinforcing rods for counterweight "A"

A

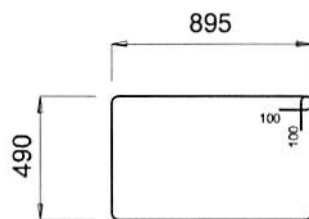
- ① Round tube $\varnothing 12$ no. 4 pieces



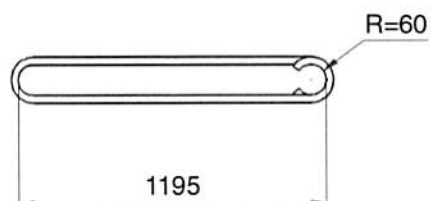
- ② Round tube $\varnothing 12$ no. 4 pieces



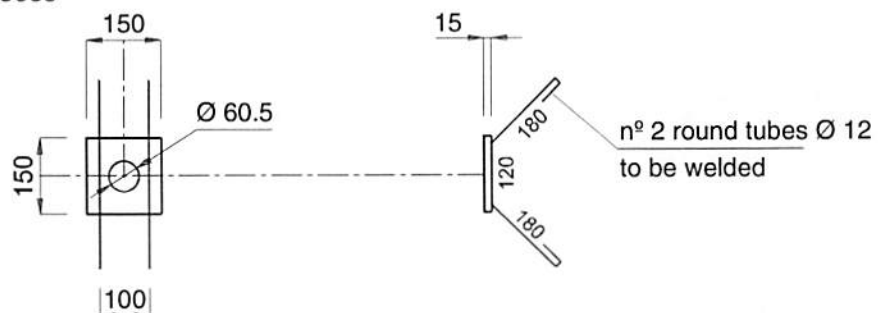
- ③ Round tube $\varnothing 8$ L=3000 no. 9 pieces



- ④ Round tube $\varnothing 30$ L=2900 no.1 piece - Fe 360 B hot bending



- ⑤ no. 2 pieces

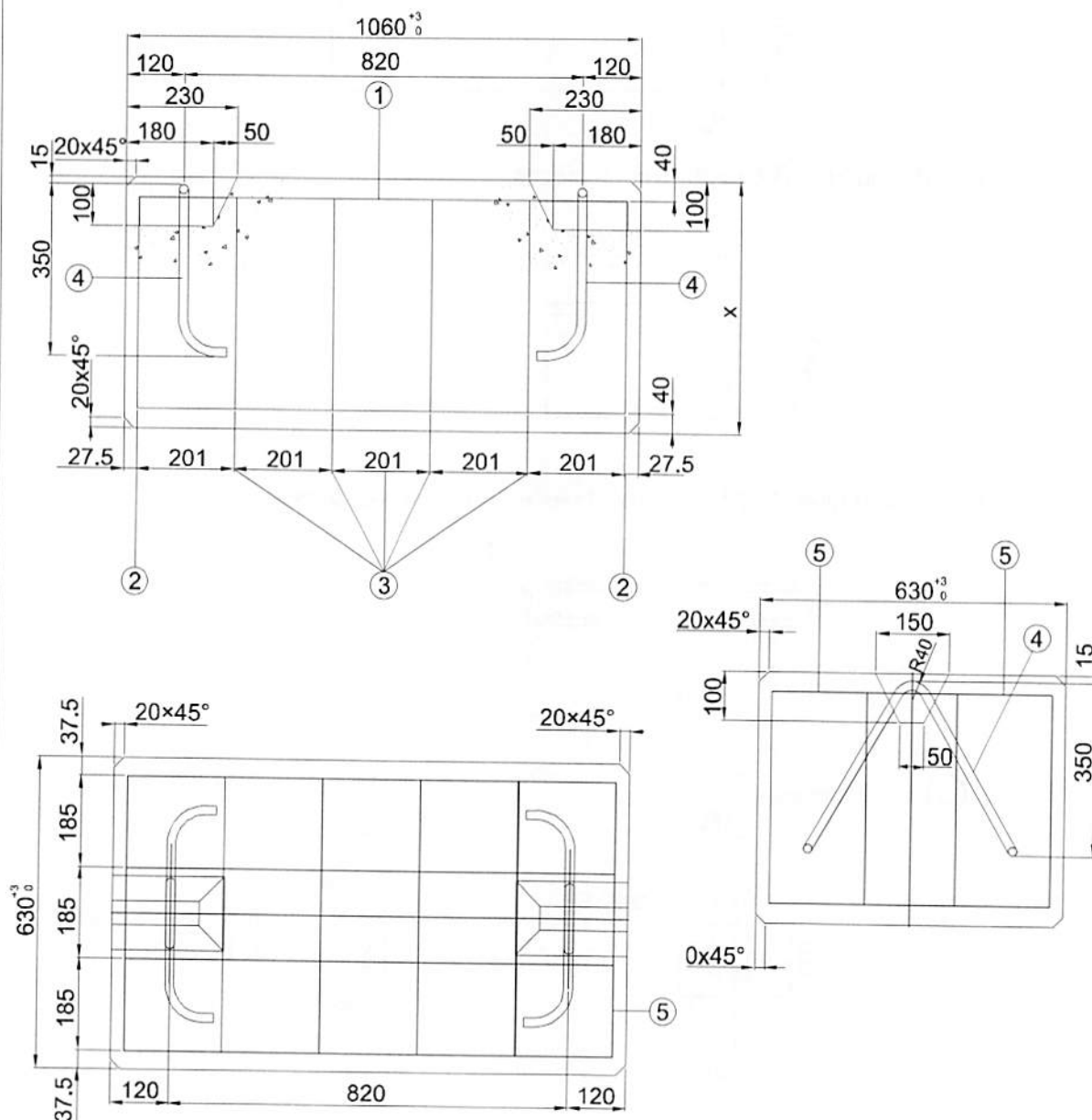
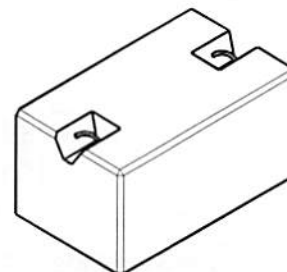


Dimensions are expressed in millimeters [1 mm = 0.03937 in.]

1.3.2 Counterweight "B" (0.8 t / 1750 lbs) - Code 390107012

B

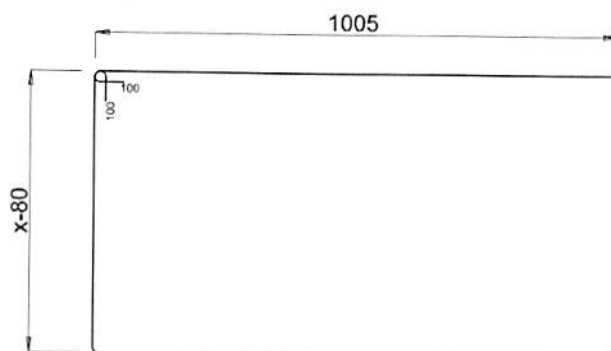
R.C. Total Specific Weight		X	
[kg/m ³]	[lbs/ft ³]	[mm]	[in.]
2300	144	530	21
2400	150	510	20
2500	156	490	19



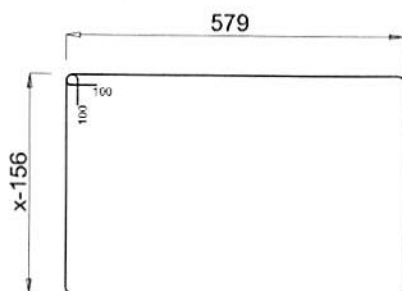
Dimensions are expressed in millimeters [1 mm = 0.03937 in.]

Reinforcing rods for counterweight "B"

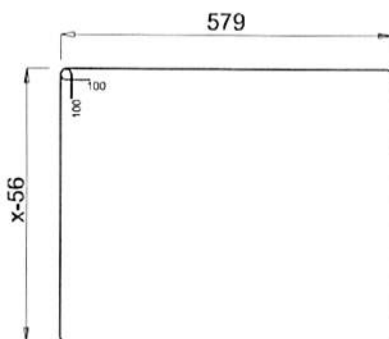
- ① Round tube Ø 12 no. 4 pieces



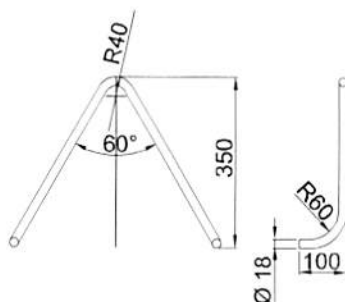
- ② Round tube Ø 12 no. 4 pieces



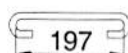
- ③ Round tube Ø 12 no. 4 pieces



- ④ Round tube Ø 180 L=940 no. 2 pieces



- ⑤ Round tube Ø 12 L=260 no. 4 pieces



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



TEREX | COMEDIL

CTT 181/A H20

Tower Installation

“F” - “T”

- 1** **LOADS ON THE GROUND**
 - 1.1 INSTALLATION “F₁” - “T₁” (stationary/travelling crane on 6×6 m / 20×20 ft undercarriage)
- 2** **BASE BALLAST**
 - 2.1 PREPARATION
 - 2.2 TYPE AND QUANTITY
 - 2.2.1 Installation “F₁” - “T₁”
 - 2.2.2 Additional subundercarriage ballast
 - 2.3 BASE BALLAST WORKING DRAWINGS
 - 2.3.1 Base ballast block **SR “A1”** (7250 kg / 15,986 lbs) - Cod. 390105007
 - 2.3.2 Base ballast block **ST “B2”** (4400 kg / 9,702 lbs) - Cod. 390106005
- 3** **BASE SUPPORTS**
 - 3.1 INSTALLATION “T”
 - 3.1.1 Assembling the rail buffers
 - 3.2 INSTALLATION “F”
 - 3.2.1 Placing the anchor bolts
 - 3.2.2 Final leveling

Chapter 3



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 tower 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



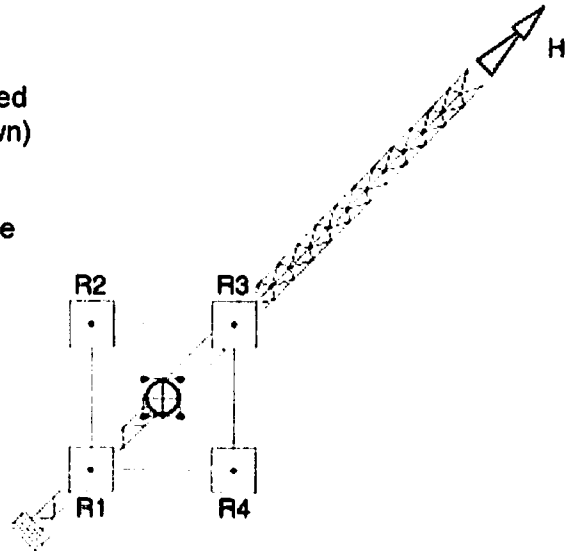
The twisting moment concerns in-service crane (for out-of-service crane, twisting moment is always 0) but does not consider the uprated dynamic safety factors (table 1.1).

CTT 181/A	
Twisting moment (M _t)	
[kNm]	[ft/lbs]
230	170000

Table 1.1

1.1 Installation "F₁" (stationary crane on 6 × 6 m / 20 × 20 ft undercarriage) Installation "T₁" (travelling crane on 6 × 6 m / 20 × 20 ft undercarriage)

V = Axial load
H = Horizontal thrust (force generated by the wind in the direction shown)
M = Overturning moment
R₁-R₂-R₃-R₄ = Minimum/Maximum loads on base supports



CTT 181/A H20			F1-T1					Undercarriage 6×6 m						
	Hook height 66 m		No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 12 tower sec. H20 18.4					Hook height 62,25 m		No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 11 tower sec. H20 18.4				
	IN SERVICE CRANE (NO WIND)													
Jlb	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
[m]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-257	-575	-894	-575	-2301	18	2704	-261	-568	-874	-568	-2271	18	2600
50-55	-256	-580	-905	-580	-2321	18	2752	-261	-573	-885	-573	-2291	18	2645
60-65	-283	-585	-888	-585	-2341	18	2564	-288	-578	-868	-578	-2311	18	2461
	IN SERVICE CRANE (TAIL WND 72KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-47	-575	-1103	-575	-2301	59	4482	-75	-568	-1061	-568	-2271	57	4181
50-55	-46	-580	-1115	-580	-2321	59	4536	-74	-573	-1071	-573	-2291	57	4230
60-65	-72	-585	-1098	-585	-2341	59	4354	-100	-578	-1055	-578	-2311	57	4052
	OUT-OF-SERVICE CRANE (TAL WND151KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	120	-470	-1276	-470	-2095	177	5925	50	-476	-1166	-476	-2067	168	5157
50-55	120	-460	-1325	-460	-2125	177	6129	50	-468	-1211	-468	-2097	168	5350
60-65	120	-429	-1397	-429	-2135	177	6437	50	-438	-1281	-438	-2107	168	5648
	OUT-OF-SERVICE CRANE (WIND BLOWING FROM JB PONT 135 KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-1596	-310	120	-310	-2095	-141	-7280	-1507	-305	50	-305	-2067	-135	-6606
50-55	-1564	-340	120	-340	-2125	-141	-7144	-1474	-336	50	-336	-2097	-135	-6465
60-65	-1496	-380	120	-380	-2135	-141	-6858	-1408	-375	50	-375	-2107	-135	-6185

CTT 181/A H20				F1-T1				Undercarriage 6×6 m						
	Hook height 58,50 m		No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 10 tower sec. H20 18.4					Hook height 54,75 m		No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 9 tower sec. H20 18.4				
IN SERVICE CRANE (NO WIND)														
Jib	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
[m]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-243	-538	-833	-538	-2151	18	2503	-202	-485	-768	-485	-1940	18	2401
50-55	-243	-543	-843	-543	-2171	18	2545	-202	-490	-778	-490	-1960	18	2442
60-65	-269	-548	-826	-548	-2191	18	2365	-228	-495	-762	-495	-1980	18	2265
	IN SERVICE CRANE (TAIL WIND 72KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-78	-538	-998	-538	-2151	55	3903	-56	-485	-913	-485	-1940	53	3636
50-55	-77	-543	-1008	-543	-2171	55	3949	-56	-490	-924	-490	-1960	53	3679
60-65	-103	-548	-992	-548	-2191	55	3773	-82	-495	-908	-495	-1980	53	3506
	OUT-OF-SERVICE CRANE (TAIL WIND151KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	0	-452	-1048	-452	-1952	160	4448	0	-429	-894	-429	-1751	151	3792
50-55	0	-446	-1091	-446	-1982	160	4632	0	-423	-935	-423	-1781	151	3969
60-65	0	-416	-1160	-416	-1992	160	4921	0	-395	-1002	-395	-1791	151	4251
	OUT-OF-SERVICE CRANE (WIND BLOWING FROM JIB POINT 135 KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-1411	-271	0	-271	-1952	-128	-5986	-1276	-238	0	-238	-1751	-121	-5416
50-55	-1377	-303	0	-303	-1982	-128	-5842	-1242	-269	0	-269	-1781	-121	-5269
60-65	-1312	-340	0	-340	-1992	-128	-5566	-1178	-307	0	-307	-1791	-121	-4997

CTT 181/A H20				F1-T1				Undercarriage 6×6 m						
	Hook height 51 m			No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 8 tower sec. H20 18.4				Hook height 47,25 m			No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 7 tower sec. H20 18.4			
IN SERVICE CRANE (NO WIND)														
Jlb	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
[m]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-183	-455	-726	-455	-1819	18	2305	-147	-402	-657	-402	-1608	18	2164
50-55	-184	-460	-736	-460	-1839	18	2344	-148	-407	-666	-407	-1628	18	2201
60-65	-209	-465	-721	-465	-1859	18	2170	-173	-412	-651	-412	-1648	18	2030
	IN SERVICE CRANE (TAIL WIND 72KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-55	-455	-854	-455	-1819	51	3388	-36	-402	-768	-402	-1608	50	3107
50-55	-56	-460	-864	-460	-1839	51	3429	-36	-407	-778	-407	-1628	50	3146
60-65	-81	-465	-849	-465	-1859	51	3257	-61	-412	-763	-412	-1648	50	2976
	OUT-OF-SERVICE CRANE (TAIL WIND151KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-34	-409	-785	-409	-1636	143	3186	-49	-359	-668	-359	-1435	135	2626
50-55	-21	-417	-812	-417	-1666	143	3356	-37	-366	-695	-366	-1465	135	2791
60-65	0	-410	-856	-410	-1676	143	3633	-8	-369	-730	-369	-1475	135	3062
	OUT-OF-SERVICE CRANE (WIND BLOWING FROM JIB POINT 135 KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-1152	-242	0	-242	-1636	-114	-4891	-1039	-198	0	-198	-1435	-108	-4408
50-55	-1118	-275	0	-275	-1666	-114	-4743	-1004	-230	0	-230	-1465	-108	-4258
60-65	-1054	-311	0	-311	-1676	-114	-4474	-941	-267	0	-267	-1475	-108	-3993

CTT 181/A H20			F1-T1					Undercarriage 6×6 m						
	Hook height 43,50 m		No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 6 tower sec. H20 18.4					Hook height 39,75 m		No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 5 tower sec. H20 18.4				
	IN SERVICE CRANE (NO WIND)													
Jlb	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
[m]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-127	-372	-617	-372	-1488	18	2077	-107	-342	-577	-342	-1367	18	1994
50-55	-128	-377	-626	-377	-1508	18	2113	-108	-347	-586	-347	-1387	18	2028
60-65	-153	-382	-611	-382	-1528	18	1944	-132	-352	-571	-352	-1407	18	1861
	IN SERVICE CRANE (TAIL WIND 72KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-31	-372	-713	-372	-1488	48	2892	-25	-342	-659	-342	-1367	46	2691
50-55	-32	-377	-722	-377	-1508	48	2929	-26	-347	-668	-347	-1387	46	2726
60-65	-57	-382	-707	-382	-1528	48	2761	-50	-352	-653	-352	-1407	46	2560
	OUT-OF-SERVICE CRANE (TAIL WIND151KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-82	-330	-579	-330	-1321	126	2108	-109	-301	-494	-301	-1206	118	1631
50-55	-70	-338	-605	-338	-1351	126	2270	-98	-309	-520	-309	-1236	118	1790
60-65	-41	-340	-639	-340	-1361	126	2537	-70	-311	-553	-311	-1246	118	2053
	OUT-OF-SERVICE CRANE (WIND BLOWING FROM JIB POINT 135 KM/H)													
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-934	-193	0	-193	-1320	-101	-3864	-839	-183	0	-183	-1206	-94	-3556
50-55	-899	-226	0	-226	-1350	-101	-3814	-802	-217	0	-217	-1236	-94	-3406
60-65	-837	-262	0	-262	-1360	-101	-3551	-741	-252	0	-252	-1246	-94	-3145

CTT 181/A H20				F1-T1				Undercarriage 6×6 m						
Hook height 36 m				No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 4 tower sec. H20 18.4				Hook height 32,25 m				No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 3 tower sec. H20 18.4		
IN SERVICE CRANE (NO WIND)														
Jib	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
[m]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-86	-312	-537	-312	-1247	18	1914	-88	-304	-521	-304	-1217	18	1837
50-55	-87	-317	-546	-317	-1267	18	1947	-89	-309	-529	-309	-1237	18	1869
60-65	-112	-322	-532	-322	-1287	18	1782	-113	-314	-515	-314	-1257	18	1705
IN SERVICE CRANE (TAIL WIND 72KM/H)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-17	-312	-607	-312	-1247	44	2503	-30	-304	-578	-304	-1217	42	2327
50-55	-18	-317	-616	-317	-1267	44	2537	-31	-309	-587	-309	-1237	42	2360
60-65	-42	-322	-601	-322	-1287	44	2372	-55	-314	-573	-314	-1257	42	2196
OUT-OF-SERVICE CRANE (TAIL WIND151KM/H)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-132	-273	-413	-273	-1091	109	1193	-172	-266	-359	-266	-1063	101	791
50-55	-121	-280	-439	-280	-1121	109	1349	-162	-273	-385	-273	-1093	101	945
60-65	-93	-283	-472	-283	-1131	109	1609	-134	-276	-417	-276	-1103	101	1203
OUT-OF-SERVICE CRANE (WIND BLOWING FROM JIB POINT 135 KM/H)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]
35-40-45	-750	-171	0	-171	-1091	-87	-3183	-670	-197	0	-197	-1063	-81	-2844
50-55	-715	-203	0	-203	-1121	-87	-3033	-635	-229	0	-229	-1093	-81	-2693
60-65	-654	-239	0	-239	-1131	-87	-2775	-575	-264	0	-264	-1103	-81	-2437

CTT 181/A H20				F1-T1				Undercarriage 6×6 m							
	Hook height 28,50 m		No. 1 tower sec. H20 18.8 TA												
			No. 1 tower sec. H20 18.10 B												
	No. 2 tower sec. H20 18.4														
	IN SERVICE CRANE (NO WIND)														
Jib	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M	
[m]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	
35-40-45	-89	-297	-504	-297	-1187	18	1762								
50-55	-90	-302	-513	-302	-1207	18	1794								
60-65	-114	-307	-499	-307	-1227	18	1631								
	IN SERVICE CRANE (TAIL WIND 72KM/H)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M	
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	
	35-40-45	-42	-297	-552	-297	-1187	40	2163							
50-55	-43	-302	-560	-302	-1207	40	2195								
60-65	-67	-307	-546	-307	-1227	40	2032								
	OUT-OF-SERVICE CRANE (TAIL WIND151KM/H)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M	
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	
	35-40-45	-209	-259	-309	-259	-1034	93	424							
50-55	-198	-266	-334	-266	-1064	93	577								
60-65	-170	-269	-367	-269	-1074	93	833								
	OUT-OF-SERVICE CRANE (WIND BLOWING FROM JIB POINT 135 KM/H)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M	
	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kNm]	
	35-40-45	-597	-219	0	-219	-1034	-74	-2535							
50-55	-562	-251	0	-251	-1064	-74	-2385								
60-65	-520	-269	-18	-269	-1074	-74	-2130								



U.S. Customary Units

CTT 181/A H20				F1-T1				Undercarriage 20x20 ft						
	Hook height 217 ft			No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 12 tower sec. H20 18.4				Hook height 204 ft			No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 11 tower sec. H20 18.4			
IN SERVICE CRANE (NO WIND)														
Jib	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
[FT]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]
115-131-148	-57670	-129309	-200947	-129309	-517235	4046	1994650	-58760	-127632	-196503	-127632	-510526	4046	1917619
164-180	-57530	-130433	-203335	-130433	-521731	4046	2029839	-58695	-128755	-198816	-128755	-515021	4046	1950721
197-213	-63627	-131557	-199486	-131557	-526226	4046	1891377	-64680	-129879	-195078	-129879	-519517	4046	1815349
IN SERVICE CRANE (TAIL WIND 45 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]
115-131-148	-10592	-129312	-248032	-129312	-517247	13286	3305552	-16892	-127634	-238376	-127634	-510537	12857	3083414
164-180	-10284	-130436	-250587	-130436	-521742	13288	3345410	-16699	-128758	-240818	-128758	-515033	12857	3120100
197-213	-16214	-131559	-246905	-131559	-526238	13286	3211602	-22557	-129882	-237207	-129882	-519528	12857	2988276
OUT-OF-SERVICE CRANE (TAIL WIND 94 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]
115-131-148	26972	-105607	-268827	-105607	-470978	39677	4369859	11239	-106931	-261972	-106931	-464588	37788	3803656
164-180	26972	-103472	-297736	-103472	-477721	39677	4520277	11239	-105246	-272137	-105246	-471331	37788	3945872
197-213	26972	-96391	-314094	-96391	-479969	39677	4747312	11239	-98390	-288011	-98390	-473578	37788	4165685
OUT-OF-SERVICE CRANE (WIND BLOWING FROM JIB POINT 84 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]
115-131-148	-358698	-69642	26972	-69642	-470971	-31762	-5369680	-338793	-68494	11239	-68494	-464583	-30245	-4872461
164-180	-351592	-76497	26972	-76497	-477714	-31762	-5268841	-331349	-75575	11239	-75575	-471326	-30245	-4768458
197-213	-336284	-85376	26972	-85376	-479962	-31762	-5058526	-316388	-84228	11239	-84228	-473574	-30245	1-45615-43

CTT 181/A H20				F1-T1				Undercarriage 20x20 ft						
	Hook height 192 ft			No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 10 tower sec. H20 18.4				Hook height 180 ft			No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 9 tower sec. H20 18.4			
IN SERVICE CRANE (NO WIND)														
Jib	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
[Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	-54569	-120861	-187152	-120861	-483442	4046	1845773	-45388	-108996	-172605	-108996	-435985	4046	1771066
164-180	-54568	-121984	-189401	-121984	-487938	4046	1877090	-45442	-110120	-174798	-110120	-440480	4046	1800841
197-213	-60456	-123108	-185761	-123108	-492433	4046	1744440	-51244	-111244	-171244	-111244	-444975	4046	1670588
IN SERVICE CRANE (TAIL WIND 45 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	-17476	-120863	-224251	-120863	-483454	12428	2878645	-12676	-108999	-205322	-108999	-435996	11998	2681938
164-180	-17377	-121987	-226597	-121987	-487949	12428	2912683	-12657	-110123	-207589	-110123	-440491	11998	2713764
197-213	-23169	-123111	-223053	-123111	-492445	12428	2782718	-18387	-111247	-204107	-111247	-444987	11996	2585524
OUT-OF-SERVICE CRANE (TAIL WIND 94 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	0	-101607	-235614	-101607	-438793	35900	3280608	0	-96376	-200879	-96376	-393597	34012	2797041
164-180	0	-100148	-245315	-100148	-445539	35900	3416142	0	-95140	-210159	-95140	-400341	34012	2927132
197-213	0	-93515	-260742	-93515	-447787	35900	3629769	0	-88734	-225172	-88734	-402588	34012	3135486
OUT-OF-SERVICE CRANE (WIND BLOWING FROM JIB POINT 84 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	-317048	-60922	0	-60922	-438789	-28728	-4415263	-286817	-53444	0	-53444	-393593	-27211	-3994514
164-180	-309520	-68002	0	-68002	-445532	-28728	-4308921	-279228	-60524	0	-60524	-400336	-27211	-3886469
197-213	-294896	-76431	0	-76431	-447780	-28728	-4105134	-264706	-68953	0	-68953	-402584	-27211	-3685528

CTT 181/A H20				F1-T1				Undercarriage 20x20 ft						
Hook height 167 ft				No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 8 tower sec. H20 18.4				Hook height 155 ft				No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 7 tower sec. H20 18.4		
IN SERVICE CRANE (NO WIND)														
Jib	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
[FT]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]
115-131-148	-41158	-102225	-163292	-102225	-408901	4046	1700304	-33035	-90361	-147687	-90361	-361443	4046	1596146
164-180	-41260	-103349	-165438	-103349	-413396	4046	1728760	-33178	-91485	-149791	-91485	-365939	4046	1623451
197-213	-46987	-104473	-161959	-104473	-417892	4046	1600608	-38838	-92609	-146379	-92609	-370434	4046	1497136
IN SERVICE CRANE (TAIL WIND 45 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]
115-131-148	-12473	-102228	-191983	-102228	-408912	11567	2499075	-8050	-90363	-172676	-90363	-361452	11137	2291872
164-180	-12520	-103352	-194184	-103352	-413408	11567	2529049	-8153	-91487	-174822	-91487	-365950	11137	2320290
197-213	-18193	-104476	-190758	-104476	-417903	11567	2402388	-13775	-92611	-171448	-92611	-370445	11137	2195060
OUT-OF-SERVICE CRANE (TAIL WIND 94 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]
115-131-148	-7555	-91951	-176347	-91951	-367803	32122	2349866	-11101	-80652	-150202	-80652	-322607	30234	1936515
164-180	-4726	-93637	-182547	-93637	-374546	32122	2475546	-8401	-82338	-156274	-82338	-329350	30234	2058633
197-213	0	-92176	-192454	-92176	-376796	32122	2679415	-1778	-82900	-164021	-82900	-331598	30234	2258689
OUT-OF-SERVICE CRANE (WIND BLOWING FROM JIB POINT 84 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS]	[LBS.FT]
115-131-148	-259041	-54413	0	-54413	-367799	-25694	-3607214	-233595	-44463	0	-44463	-322603	-24176	-3250862
164-180	-251183	-61718	0	-61718	-374542	-25694	-3497952	-225707	-51768	0	-51768	-329346	-24176	-3140766
197-213	-236979	-69922	0	-69922	-376790	-25694	-3299607	-211587	-59972	0	-59972	-331594	-24176	-2944753

CTT 181/A H20				F1-T1				Undercarriage 20x20 ft						
	Hook height 143 ft			No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 6 tower sec. H20 18.4				Hook height 130 ft			No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 5 tower sec. H20 18.4			
IN SERVICE CRANE (NO WIND)														
Jib	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
[Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	-28570	-83590	-138610	-83590	-334360	4046	1531934	-24007	-76819	-129631	-76819	-307276	4046	1470466
164-180	-28748	-84714	-140679	-84714	-338855	4046	1558258	-24216	-77943	-131670	-77943	-311771	4046	1495934
197-213	-34352	-85838	-137324	-85838	-343350	4046	1433536	-29769	-79067	-128364	-79067	-316267	4046	1372599
IN SERVICE CRANE (TAIL WIND 45 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	-6986	-83592	-160199	-83592	-334369	10708	2132972	-5545	-76821	-148098	-76821	-307285	10277	1984567
164-180	-7136	-84716	-162296	-84716	-338864	10708	2160092	-5734	-77945	-150156	-77945	-311780	10277	2010596
197-213	-12712	-85840	-158969	-85840	-343362	10708	2036145	-11269	-79070	-146870	-79070	-316278	10277	1887792
OUT-OF-SERVICE CRANE (TAIL WIND 94 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	-18361	-74203	-130046	-74203	-296813	28346	1554835	-24548	-67755	-110962	-67755	-271021	26458	1203019
164-180	-15763	-75889	-136015	-75889	-303556	28346	1674092	-22032	-69441	-116850	-69441	-277764	26458	1320011
197-213	-9256	-76451	-143646	-76451	-305804	28346	1870932	-15623	-70003	-124383	-70003	-280012	26458	1514122
OUT-OF-SERVICE CRANE (WIND BLOWING FROM JIB POINT 84 MPH)														
	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	-209988	-43409	0	-43409	-296809	-22659	-2923334	-188478	-41231	0	-41231	-271017	-21142	-2622867
164-180	-202081	-50714	0	-50714	-303552	-22659	-2812700	-180335	-48761	0	-48761	-277760	-21142	-2511908
197-213	-188036	-58918	0	-58918	-305799	-22659	-2618773	-166581	-56740	0	-56740	-280007	-21142	-2319825

CTT 181IA H20		F1-T1		Undercarriage 20x20 ft	
Hook height 118 ft No. 1 tower sec. H20 18.8 TA No. 4 tower sec. H20 18.4		Hook height 106 ft No. 1 tower sec. H20 18.8 TA No. 3 tower sec. H20 18.4			
IN SERVICE CRANE (NO WIND)					
Jib	R1	R2	R3	R4	V
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
115-131-148	-19356	-70048	-120740	-70048	-280192
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
164-180	-19591	-71172	-122753	-71172	-284688
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
197-213	-25102	-72296	-119489	-135121	-72296
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
IN SERVICE CRANE (TAIL WIND 45 MPH)					
R1	R2	R3	R4	V	H
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
115-131-148	-3755	-70050	-136345	-70050	-280201
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
164-180	-3977	-71174	-138372	-71174	-284697
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
197-213	-9475	-72298	-135121	-72298	-289192
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
OUT-OF-SERVICE CRANE (TAIL WIND 94 MPH)					
R1	R2	R3	R4	V	H
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
115-131-148	-29717	-61307	-92896	-61307	-245227
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
164-180	-27265	-62992	-98720	-62992	-251970
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
197-213	-20937	-63554	-106172	-63554	-254218
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
OUT-OF-SERVICE CRANE (WIND BLOWING FROM JIB POINT 84 MPH)					
R1	R2	R3	R4	V	H
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
115-131-148	-168559	-38379	0	-38379	-245222
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
164-180	-160635	-45684	0	-45684	-251965
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]
197-213	-146939	-53663	0	-53663	-254213
	[lbs]	[lbs]	[lbs]	[lbs]	[lbs]

CTT 181/A H20				F1-T1				Undercarriage 20x20 ft						
Hook height 94 ft		No. 1 tower sec. H20 18.8 TA No. 1 tower sec. H20 18.10 B No. 2 tower sec. H20 18.4												
IN SERVICE CRANE (NO WIND)														
Jib	R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M
[Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	-20013	-66693	-113374	-66693	-266774	4046	1299728							
164-180	-20289	-67817	-115345	-67817	-271269	4046	1323338							
197-213	-25734	-68941	-112148	-68941	-275764	4046	1203027							
IN SERVICE CRANE (TAIL WIND 45 MPH)														
R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M	
[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	-9408	-66696	-123983	-66696	-266783	8986	1595062							
164-180	-9679	-67820	-125960	-67820	-271278	8986	1618826							
197-213	-15119	-68943	-122768	-68943	-275773	8986	1498648							
OUT-OF-SERVICE CRANE (TAIL WIND 94 MPH)														
R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M	
[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	-46877	-58112	-69348	-58112	-232449	20794	312836							
164-180	-44511	-59798	-75085	-59798	-239192	20794	425631							
197-213	-38306	-60360	-82413	-60360	-241439	20794	614041							
OUT-OF-SERVICE CRANE (WIND BLOWING FROM JIB POINT 84 MPH)														
R1	R2	R3	R4	V	H	M	R1	R2	R3	R4	V	H	M	
[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs]	[Lbs.Ft]
115-131-148	-134259	-49120	0	-49120	-232444	-16590	-1869884							
164-180	-126334	-56425	0	-56425	-239187	-16590	-1758749							
197-213	-116778	-60359	-4046	-60359	-241435	-16590	-1570900							

2 BASE BALLAST

2.1 PREPARATION

The ballast blocks shall be prepared with maximum precision.

They shall be installed once they have been cured and the exact weight has been established.



The weight of the base ballasts shall be within a tolerance of $\pm 3\%$

The base ballast satisfies stability according to F.E.M./DIN standards.

2.2 TYPE AND QUANTITY

Position on the undercarriage (installations "F" and "T") the exact quantity and type of ballast required by the tower height of the crane.

CTT 181/A H20		BASE BALLAST	
BLOCK TYPE		WEIGHT OF BLOCK	
		kg	lbs
SR "A1"	Code 390105007	7250	15,986
ST "B2"	Code 390106005	4400	9,702
D	Additional subundercarriage ballast (concrete bed min. weight - if stationary crane, or of out-of-service parking area - if travelling crane)		

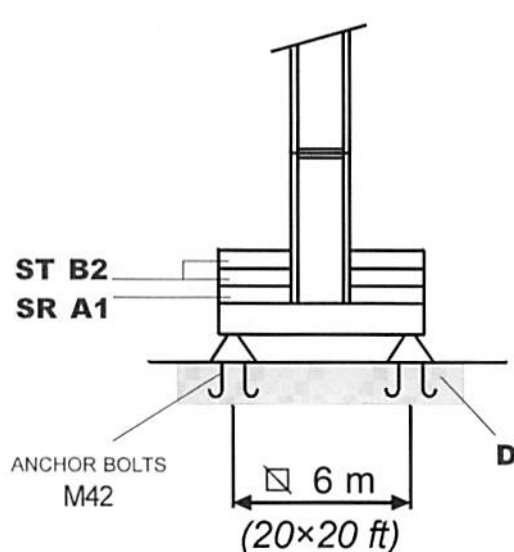
Table 2.2.1

2.2.1 Installation "F₁" - "T₁"

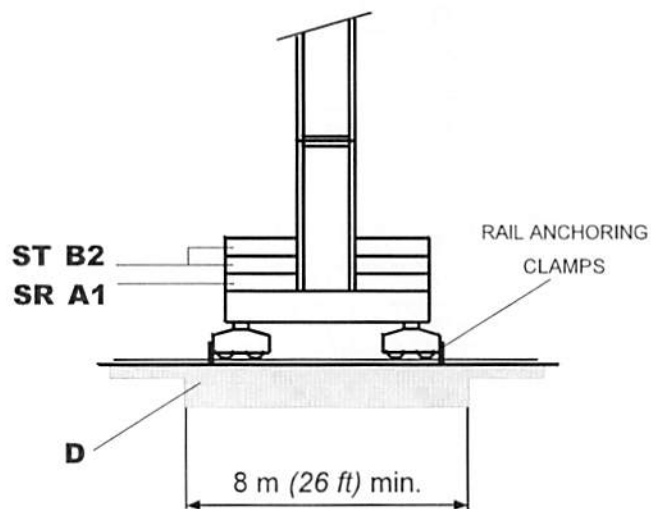


Stationary crane on undercarriage (6×6 m / 20×20 ft)

Travelling crane on undercarriage (6×6 m / 20×20 ft)



F1



T1

CTT 181/A H20		Base ballast		
F1-T1		Block type		
Tower height				Total ballast
	SR "A1" (7,25 t)	ST "B2" (4,4 t)	D	
[m]	[no.]	[no.]	[l]	[l]
66	2	24	50	170,1
62,25	2	24	20	140,1
58,50	2	22	0	111,3
54,75	2	18	0	93,7
51	2	16	0	84,9
47,25	2	12	0	67,3
43,50	2	10	0	58,5
39,75	2	8	0	49,7
36	2	6	0	40,9
32,25	2	6	0	40,9
28,50	2	6	0	40,9

Table 2.2.2



U.S. Customary Units

CTT 181A H20				
Base ballast				
F1-T1				
Tower height	Block type			Total ballast
	SR "A1" (15,986 lbs)	ST "B2" (9,702 lbs)	D	
[ft]	[no.]	[no.]	[lbs]	[lbs]
217	2	24	110250	375070
204	2	24	44100	308920
192	2	22	0	245416
180	2	18	0	206608
167	2	16	0	187204
155	2	12	0	148396
143	2	10	0	128992
130	2	8	0	109588
118	2	6	0	90184
106	2	6	0	90184
94	2	6	0	90184

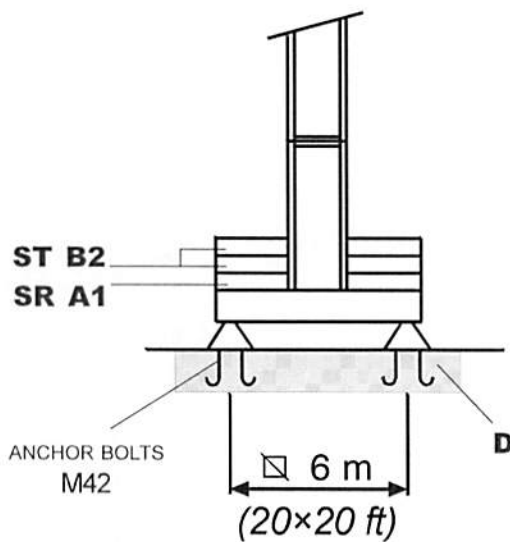
2.2.2 Additional subundercarriage ballast



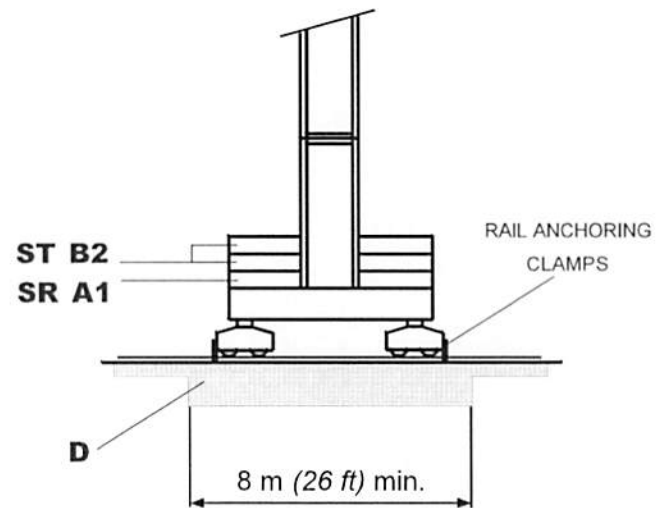
For the stability of the crane, both installation "**T₁**" and "**F₁**" for tower heights with "**D**" value >0 (see table 2.2.2) need an additional ballasting "**D**" under the undercarriage.

For installation "**T₁**" (picture 2.2.1) make heavier the concrete kerbs connected to the rail tacks in the proper area used for parking the crane in out-of-service condition (out-of-service parking area with min. side 8 m / 26 ft approx.), securing the clamps of the bogies to the rail tracks themselves in that area.

For installation "**F₁**" (picture 2.2.2) arrange 4 concrete beds (one for each base support) or just one concrete bed with min. side 8 m (26 ft) to which two M42 anchor bolts for each plate shall be diagonally tied (para. 3.2) .



Picture 2.2.1



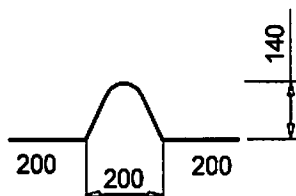
Picture 2.2.2

SR "A1"

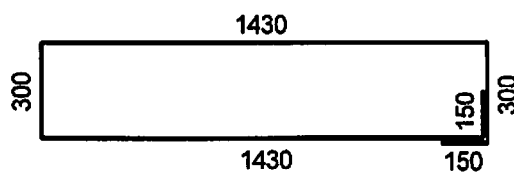
Reinforcing rods for base ballast **SR "A1"****SR "A1"**

Round bar Ø 20	Length		Quantity
	[mm]	[inches]	
Pos. 1	5650	222	16
Pos. 2	5200	205	4
Pos. 3	5450	215	4

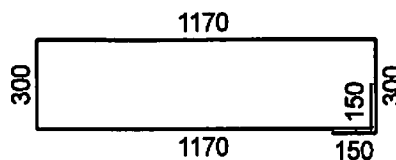
- ④ Round bar Ø 16 L=750 No. 16 pcs.



- ③ Round bar Ø 12 L=3760 No. 20 pcs.



- ⑦ Round bar Ø 12 L=3240 No. 2 pcs.



Concrete: anti-freeze B 255 (INORM B 4200 standard) or anti-freeze B 25 (Din 1045 standard)

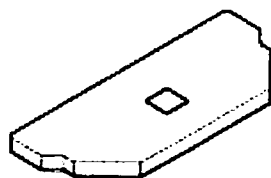
Steel: STS 50/620

SEASONING: FOUR WEEKS

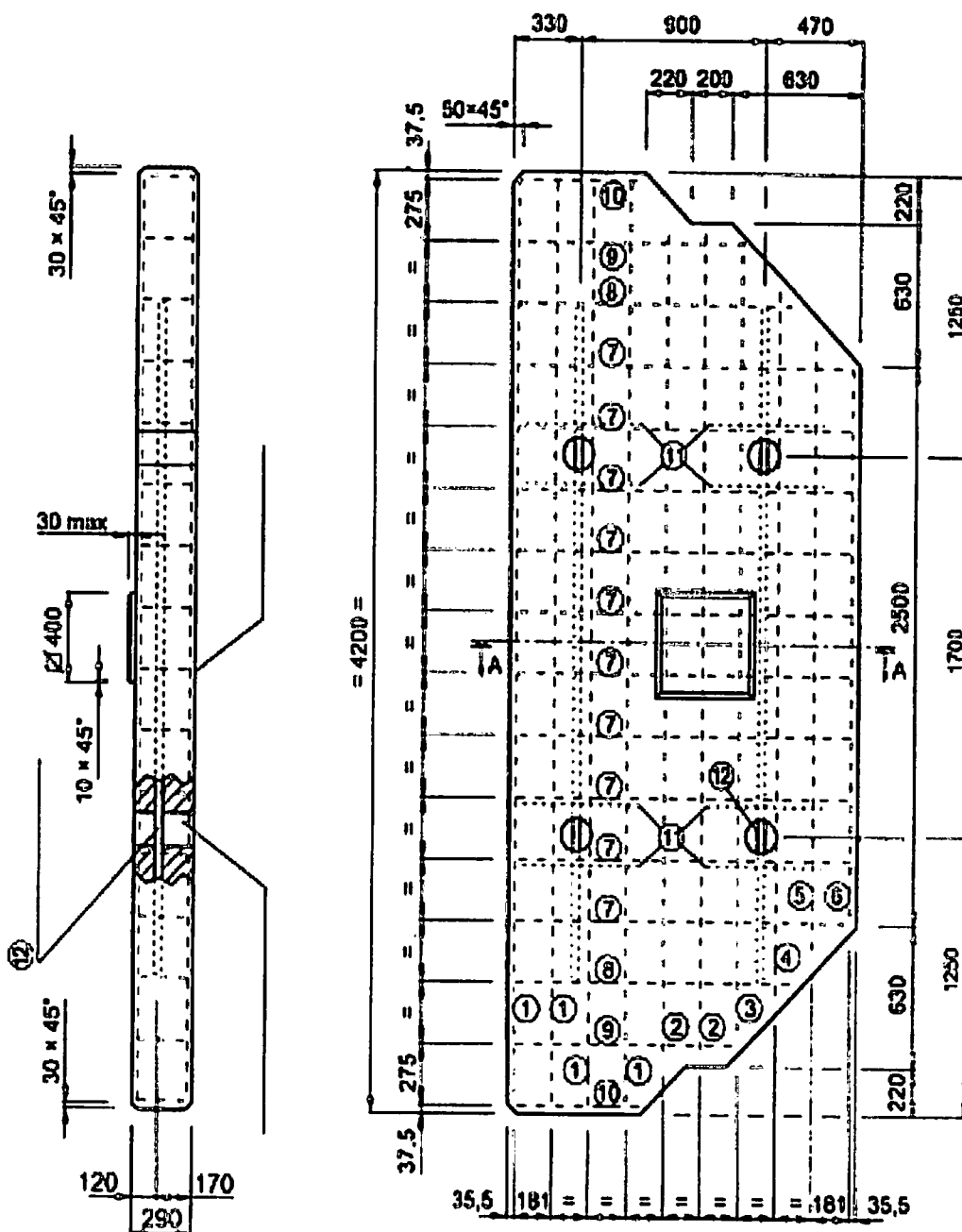
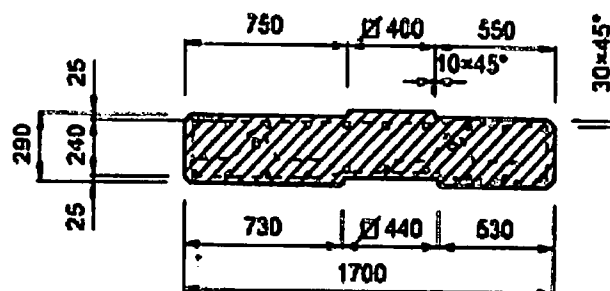
2.3.2

Base ballast block **ST "B2"** (4400 kg / 9,700 lbs) -
Code 390106005

ST "B2"



Section A

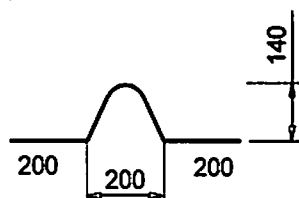


Dimensions are expressed in millimetres [1 mm = 0.03937 in.]

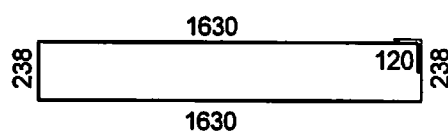
Reinforcing rods for base ballast **ST "B2"****ST "B2"**

Round bar Ø 20	Length		Quantity
	[mm]	[inches]	
Pos. 1	4095	161	10
Pos. 2	3700	146	2
Pos. 3	3400	134	2
Pos. 4	3000	118	2
Pos. 5	2700	106	2
Pos. 6	2400	94	2

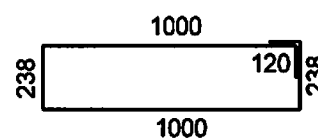
⑪ Round bar Ø 16 L=750 No. 8 pcs.



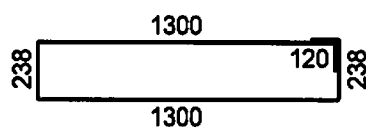
⑦ Round bar Ø 10 L=2980 No. 10 pcs.



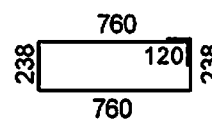
⑨ Round bar Ø 10 L=2720 No. 2 pcs.



⑧ Round bar Ø 10 L=3320 No. 2 pcs.



⑩ Round bar Ø 10 L=2250 No. 2 pcs.



Concrete: anti-freeze B 255 (INORM B 4200 standard) or anti-freeze B 25 (Din 1045 standard)

Steel: STS 50/620

SEASONING: FOUR WEEKS

3

BASE SUPPORTS



Comedil just provides some general requirements concerning the dimensions of the supports. The actual dimensions shall be calculated by the designer engineer according to the geological characteristics of the ground and to the stresses at the crane base.



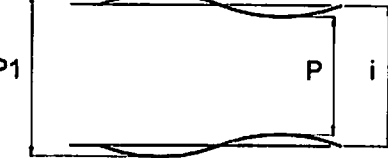
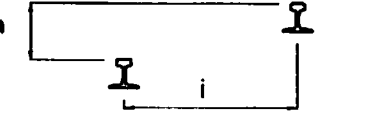
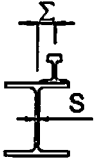
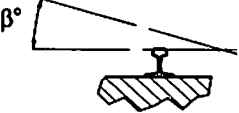
3.1

INSTALLATION "T"



For travelling cranes on rails "T" the user shall install travel tracks according to CNR 10021/85 standards. The main provisions are given below:

- A) the travel tracks shall be perfectly leveled both longitudinally and transversally;
- B) the gauge shall be constant and the rail tracks perfectly straight and with the same shape along the entire path;
- C) the rail tracks shall be placed on a solid base;
- D) travelling stop buffers shall be placed at the ends of the rail tracks (picture 3.1.3).

RAIL SHAPE TOLERANCES [mm]		
Straightness on the horizontal plane of a rail		$L = 2000$ $r = \pm 1$
Straightness on the vertical plane of a rail		$V/L \leq 0,002$
Parallelism of the rails		$P-i \leq 3$
Difference in level		$h/i \leq 0,002$
Eccentricity of the rail about the beam		$\Sigma \leq 0.5 S$ for $S < 12$ mm $\Sigma \leq 6$ mm for $S \geq 12$ mm
Inclination of the rail about the horizontal plane		$\beta^\circ \pm 0.003$ radius.

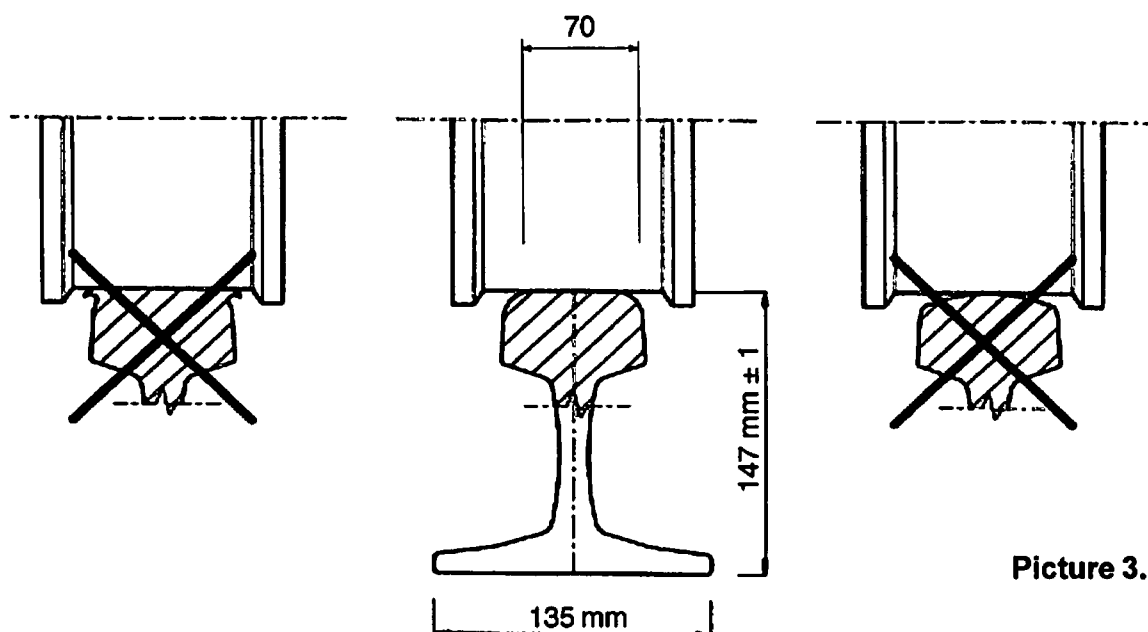
Dimensions are expressed in millimeters [1 mm = 0.03937 in.]

Table 3.1.1

The rail shall be 50 UNI 3141 type and have a nominal head of 70 mm (0,23 ft) and weight per metre of 50 kg (110 lbs).

Slightly used rails are preferable as they provide a better bearing surface (picture 3.1.1).

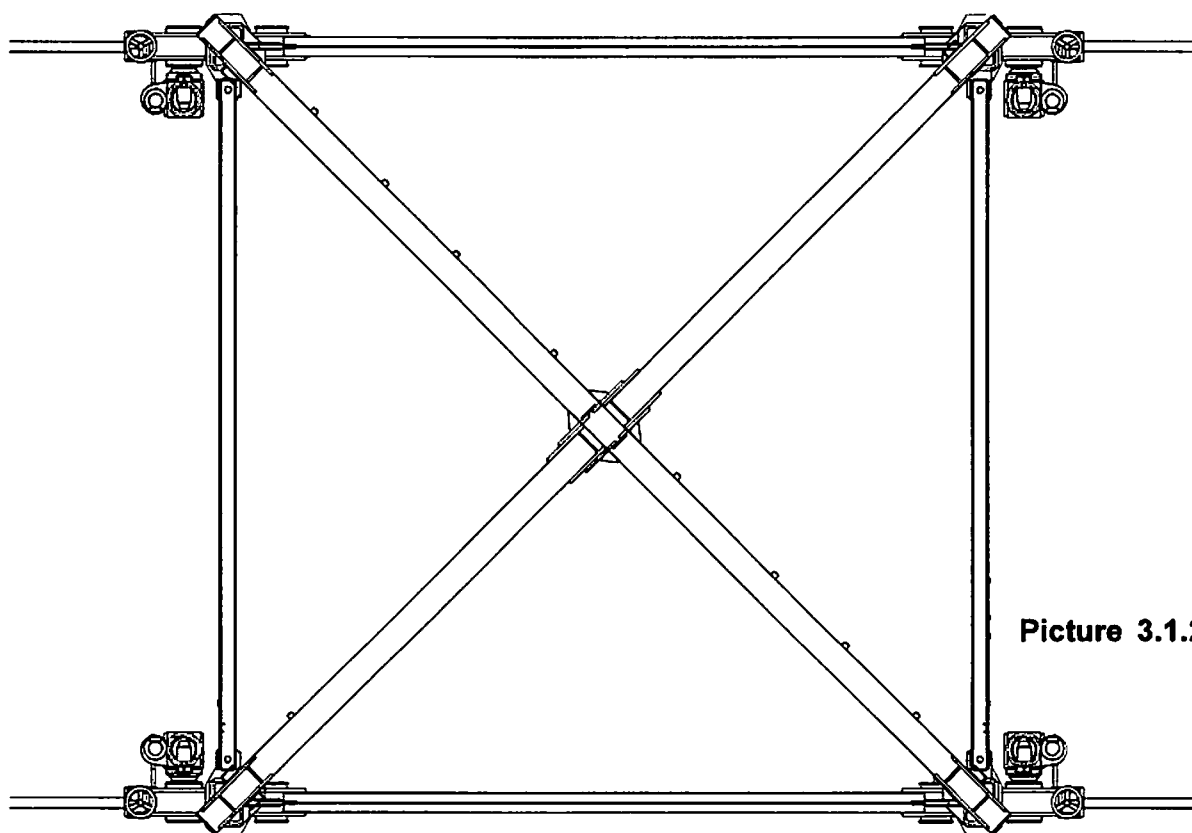
Dimensions are approximate. In fact, the rails shall be chosen according to the travelling equipment used and to the crane own configuration.



Picture 3.1.1

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

Position the base supports as shown in picture 3.1.2.



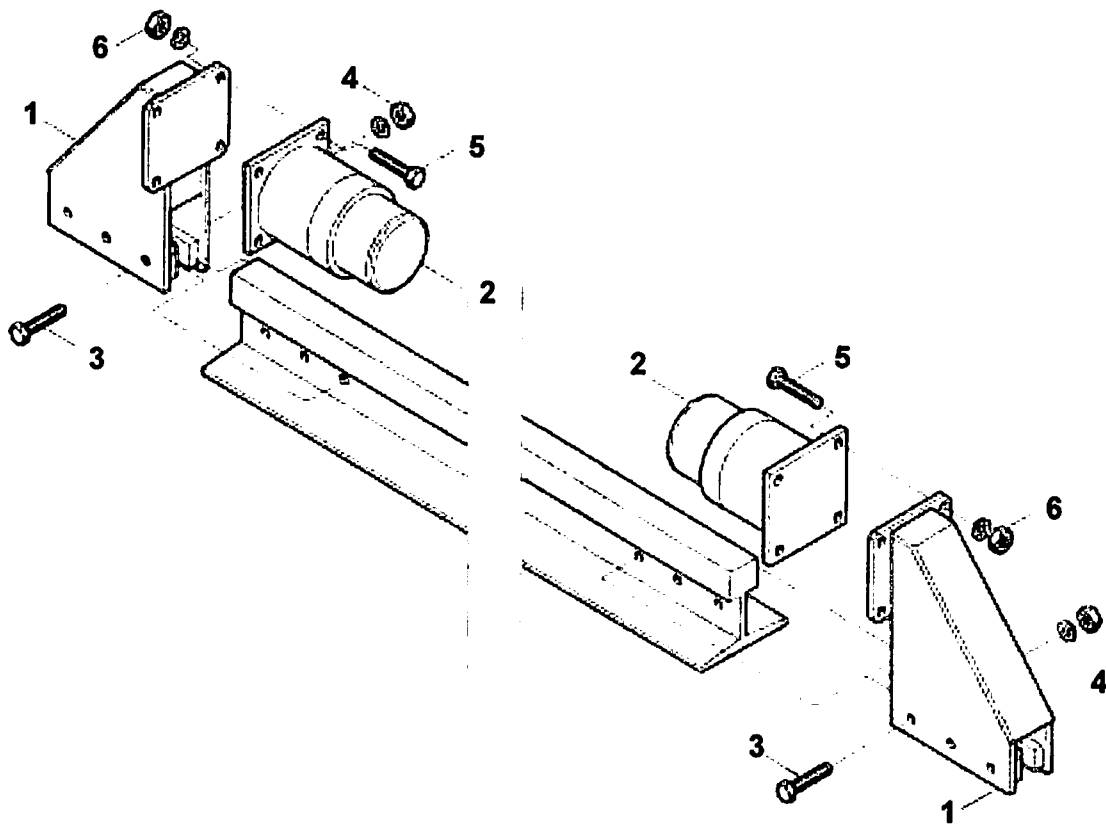
Picture 3.1.2

3.1.1 Assembling the rail buffers

Make the fixing holes on rail buffer support (1) match those on the rail track.

Place screws (3) and secure them with nuts (4).

Connect rail buffer (2) to rail buffer support (1) with screws (5) and nuts (6) (picture 3.1.3).



Picture 3.1.3

IMPORTANT NOTICE



For tower heights where value "D" is >0 (see table 2.2.2) follow the indications given at para. 2.2.2.

3.2 APPOGGIO "F"

Stationary crane on undercarriage ("F" installation) requires four concrete beds (one for each base plate).

For tower heights with the "D" value = 0 (see table 2.2.2) the crane can simply rest on them. With tower heights with the "D" value > 0 (see table 2.2.2) instead, the crane shall be anchored to the four concrete beds by two M42 anchor bolts for each base plate positioned one diagonal to the other (picture 3.2.1).

The concrete bed "L" side could be calculated with the formula:

$$L = \sqrt{\frac{R}{\sigma t}}$$

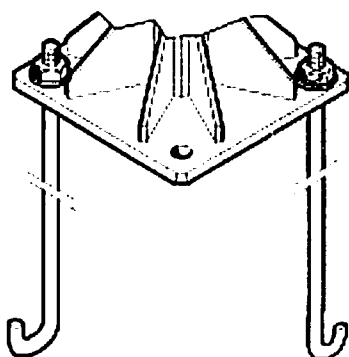
where "R" represents the highest value indicated at para. 1.1 and "σt" the ground resistance.

The dimensions of the concrete foundations shall be calculated anyhow by the designer engineer responsible for the concrete works, who shall refer to the load values indicated in the tables (para. 1.1) and to the ground resistance values measured.

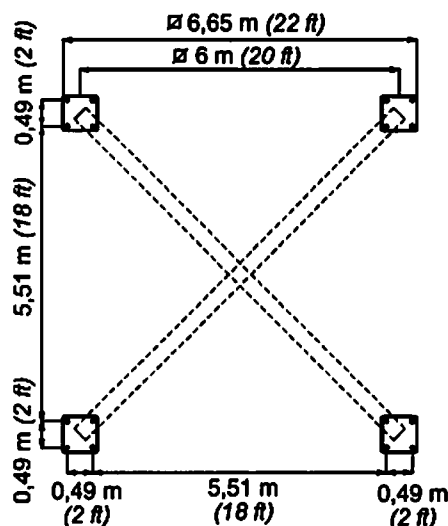
At the customer's convenience, the four concrete beds can be replaced by a single concrete bed.

3.2.1 Placing the anchor bolts

Place 2 M42 Comedil anchor bolts for each base plate positioned one diagonal to the other (pictures 3.2.1 and 3.2.2).



Picture 3.2.1



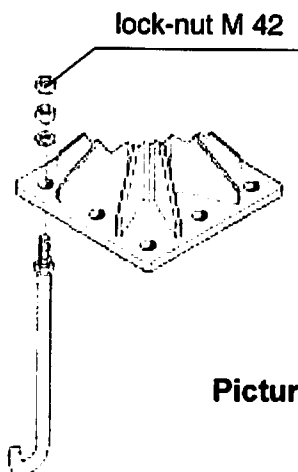
Picture 3.2.2

The minimum weight of the concrete beds shall conform to the values indicated in table 2.2.2.

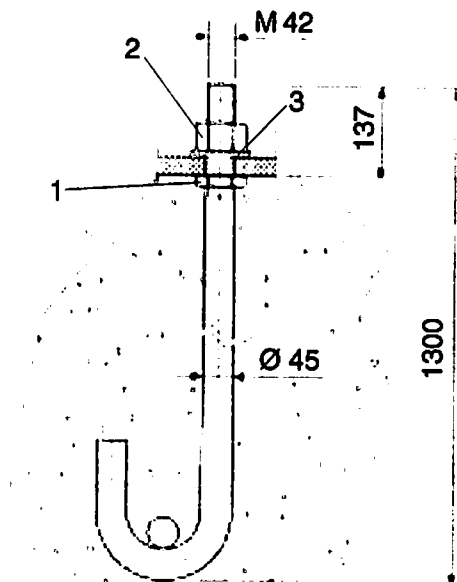
For the positioning of the anchor bolts proceed as follows:

- Screw down flat nut M42 (1) on the anchor bolt until there is 137 mm (5 in) clearance between the base plate bottom and the anchor bolt head.
- Place the anchor bolt in the hole of the plate.
- Position washer (3) and screw tall nut M42 (2).
- Now the anchor bolts stay at right angle about the surface of the base plate (picture 3.2.3).

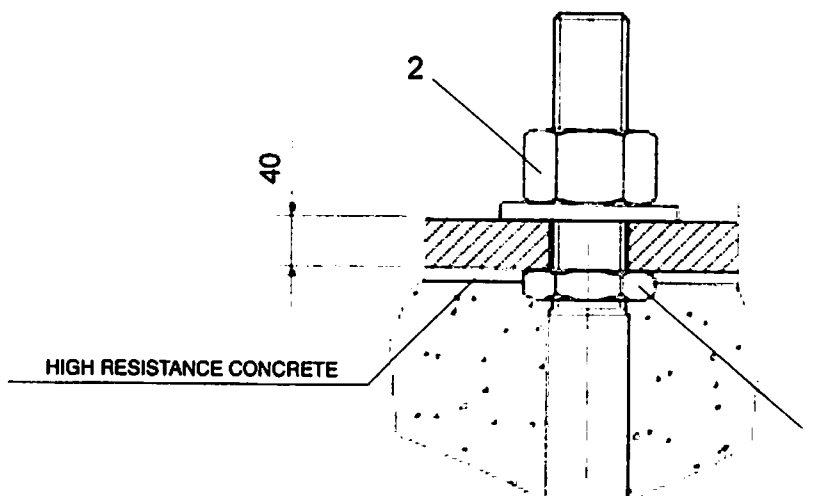
Dimensions are expressed in millimetres [1 mm = 0.03937 in.]



Picture 3.2.3



- Weld or connect the anchor bolts to the reinforcement mesh cage.
- Remove the shims used for leveling.
- Check the base plates for proper level.
- The undercarriage 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.
- Secure nuts (2) (picture 3.2.4) with lock-nuts M42, thus preventing them from loosening.
- To correct any leveling error, rotate nuts (1) and (2) (picture 3.2.4).
- 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 3.2.4).



Picture 3.2.4

3.2.2 Final leveling

To correct any leveling error, remove the lock nuts and tall nuts M42. Then place shims where necessary.

Screw tall nuts M42 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 1450 Nm (1.069 lbs ft).

NOTICE

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.



TEREX | COMEDIL

CTT 181/A

Slewing Upper Part

Spare Parts and Maintenance

- 1 SPARE PARTS**
- 2 MAINTENANCE**
 - 2.1 GENERAL**
 - 2.2 GROUPS SUBJECT TO MAINTENANCE**
 - 2.3 ROUTINE MAINTENANCE AND PERIODICAL INSPECTIONS**
 - 2.3.1 Daily inspections
 - 2.3.2 Weekly inspections
 - 2.3.3 Monthly inspections
 - 2.3.4 Quarterly inspections
 - 2.3.5 Six-monthly inspections
 - 2.3.6 Annual inspections
 - 2.4 SPECIAL MAINTENANCE**
 - 2.5 LUBRICATION AND OILS**
 - 2.6 ROPES**
 - 2.6.1 Instructions for the installation of the ropes
 - 2.6.1.1 *Spooling off new ropes*
 - 2.6.1.2 *Rope loading break-in-period*
 - 2.6.1.3 *Rope replacement*
 - 2.6.1.4 *Common rope defects*
 - 2.7 SHEAVES**

Chapter 5

D

1

SPARE PARTS

Indice - Index - Sommaire - Inhaltsangabe

PARTI DI RICAMBIO - SPARE PARTS - PIECES DE RECHANGE - ERSATZTEILE				
CODICE DI GRUPPO	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
313541020	Portaralla inferiore (TS21)	Lower slewing ring support		
313523090	Portaralla inferiore (H20)	Lower slewing ring support		
313540012	Portaralla inferiore (TS212)	Lower slewing ring support		
313702041	Portaralla superiore	Upper slewing ring support		
	Complessivo collettore	Slip ring unit		
314002060	Traliccio cabina	Cab tower section		
333100040	Cabina standard	Standard cab		
333100070	Cabina "LX"	"LX" cab		
114316040	Controbraccio STD	Standard counterjib		
114316041	Controbraccio puleggia scorrevole	Smooth pulley counterjib		
390107011	Contrappeso "A"	"A" Counterweight		
390107012	Contrappeso "B"	"B" Counterweight		
214516220	Tronco braccio-22 STD	Jib section-22 STD		
214516002	Tronco braccio-22 F11	Jib section-22 F11		
314616230	Tronco braccio-23	Jib section-23		
314616240	Tronco braccio-24	Jib section-24		
314616250	Tronco braccio-25	Jib section-25		
314616050	Tronco braccio-5	Jib section-5		
314616060-1	Tronco braccio-6	Jib section-6		
314616070	Tronco braccio-7	Jib section-7		
314616080	Tronco braccio-8	Jib section-8		
314616090	Tronco braccio-9	Jib section-9		
314616100	Tronco braccio-10	Jib section-10		
214916020	Puntale braccio	Jib point section		
217701020	Carrello 6-8 t	6-8 t Trolley		
320301311	Ballatoio carrello	Jib inspection platform		
217808050	Bozzello doppio 8t	Double Hoist block		
217804030	Bozzello tiro in II (3-4 t)	Hoist block		
217808060	Semibozzello tiro in IV (6-8 t)	Auxiliary hoist block		
226400035-1	Supporto "A" fune carrello	"A" support for trolley rope		
226400036	Supporto "B" fune carrello	"B" support for trolley rope		
126400100	Supporto "C" fune carrello	"C" support for trolley rope		
225100080	Golfare montaggio braccio	Eyebolt for jib assembly		
326400045	Supporto tabella di portata	Load rating chart support		

**RICAMBI
SPARE PARTS
PIECES DE RECHANGE
ERSATZTEILE**

**Istruzioni per l'uso
Instructions for use
Mode d'emploi
Gebrauchsanleitung**

A	B	C	D	E	F	G
----------	----------	----------	----------	----------	----------	----------

POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
243501010			TRASLAZIONE MOTRICE TAD 1RP 2M3	DRIVE TRAVELLING BOX		
1	346202001	1	Chiusura per scatola motrice	Cover		
2	840206005	2	Cusc. 22219 E TVPB (95 x 170 x 43)	Bearing		
3	346903040	1	Perno mot. 110 x 293	Motor pin		
4	347201010	1	Flangia attacco riduttore	Reduction gear		
5	845257001	1	Riduttore 1/51,7	Reduction gear		

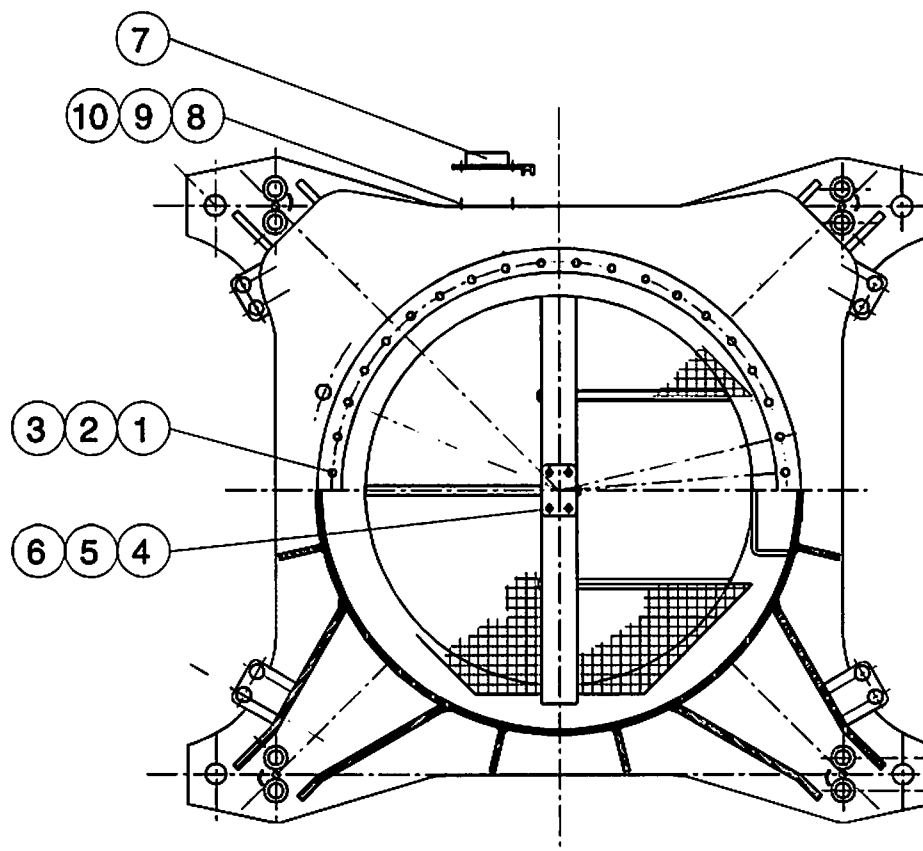
Colonna A: posizione di riferimento su disegno d'insieme
Colonna B: codice particolare
Colonna C: quantità particolare
Colonna D: descrizione in lingua italiana
Colonna E - F - G: descrizione nelle varie lingue

Column A: part reference number on the assembly drawing
Column B: part code
Column C: part quantity
Column D: Italian designation
Column E - F - G: designations for the various languages

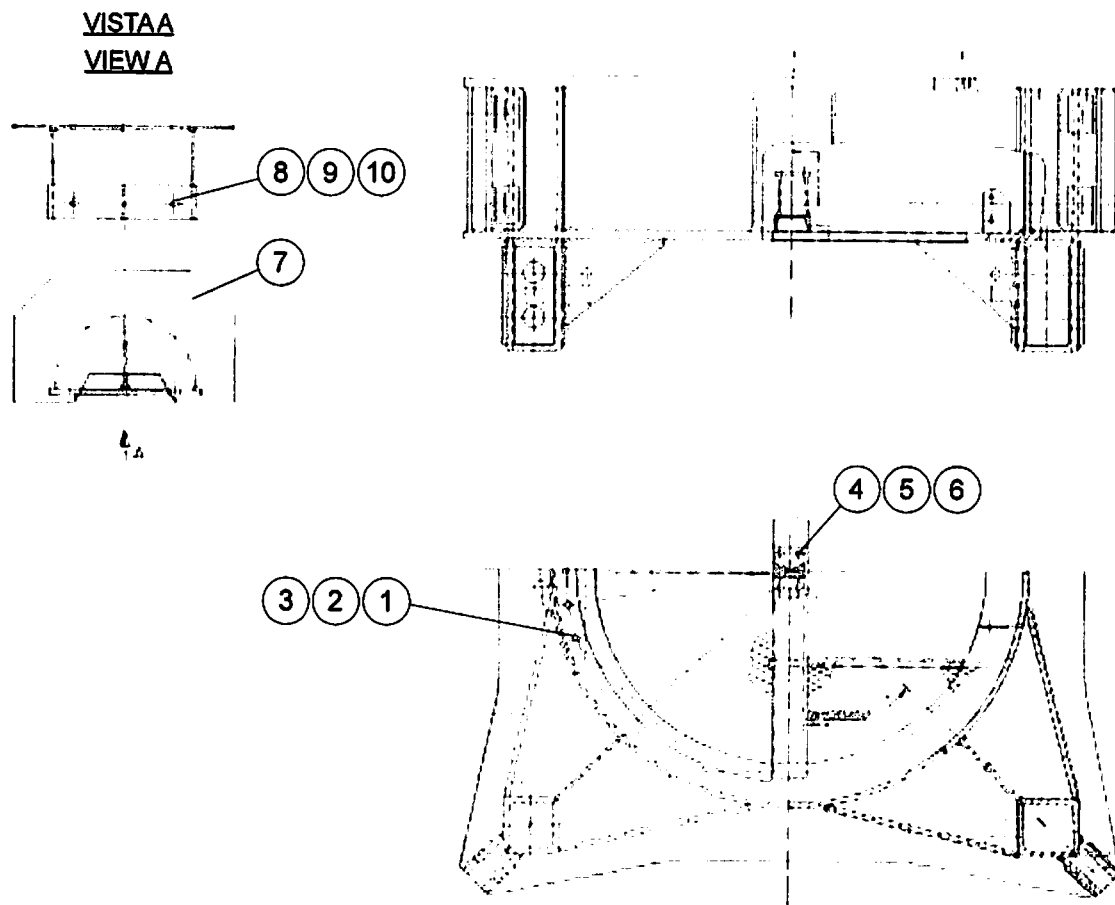
Colonne A: repère sur dessin d'ensemble
Colonne B: référence particulière
Colonne C: quantité particulière
Colonne D: description en italien
Colonne E - F - G: description dans les autres langues

Kolonne A: Referenznummer auf der Gesamtzeichnung
Kolonne B: Einzelheiten - Code
Kolonne C: Anzahl Einzelheiten
Kolonne D: Beschreibung in italienisch
Kolonne E - F - G: Beschreibung in verschiedenen Sprachen

PORTARALLA INFERIORE (TS21)
LOWER SLEWING RING SUPPORT

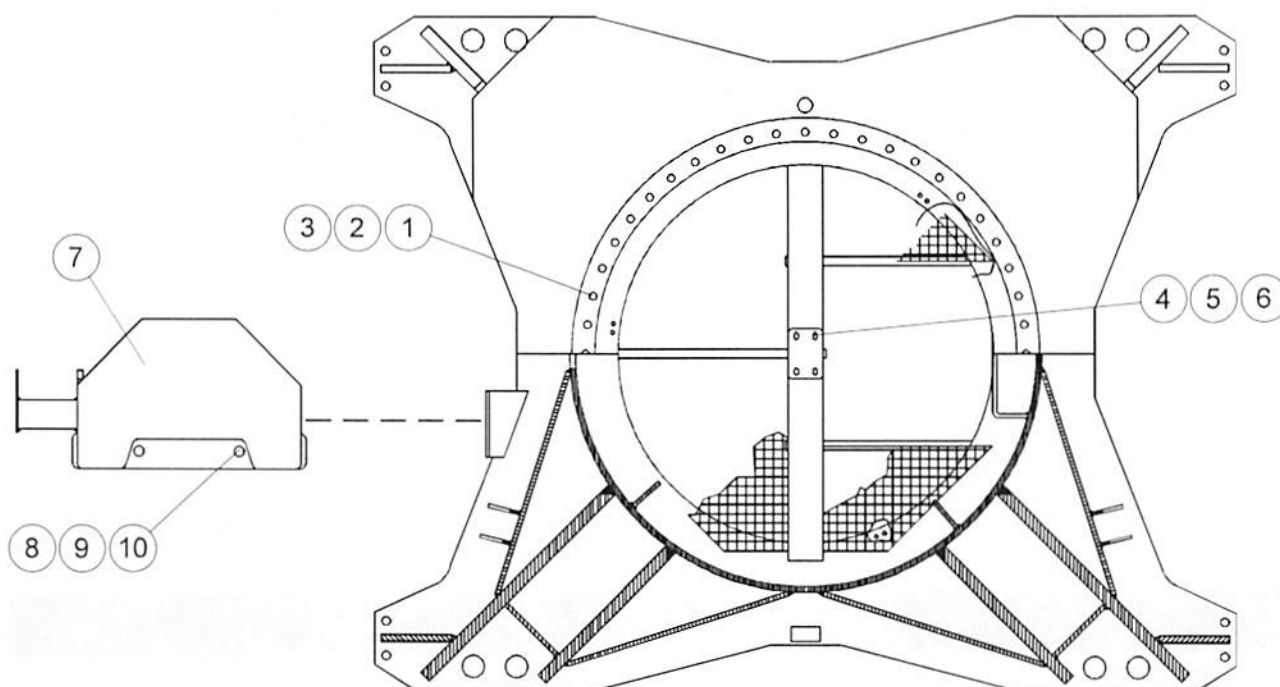
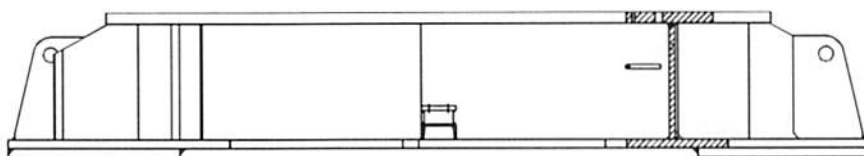


POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
313641020			PORTARALLA INFERIORE (TS21)	LOWER SLEWING RING SUPPORT		
1	880234010	48	VITE TCEI M24 x 160 N - CL.10.9	SCREW		
2	881736004	48	RONDELLA M24 N - C50	WASHER		
3	881224006	48	DADO ALTO M24 N - CL.10	TALL NUT		
4	880133115	4	VITE TEIF M14 x 50 Z - 8.8	SCREW		
5	881732006	4	RONDELLA M14 Z - 6.8	WASHER		
6	881224014	4	DADO ALTO M14 Z - CL. 10	TALL NUT		
7	328701006	1	SUPPORTO CAVI ALIMENTAZIONE	CABLES SUPPORT		
8	880133126	2	VITE TEIF M16 x 50 Z - 8.8	SCREW		
9	881732007	2	RONDELLA M16 Z - 6.8	WASHER		
10	881224015	2	DADO ALTO M16 Z - CL. 10	TALL NUT		

**PORTARALLA INFERIORE (H20)
LOWER SLEWING RING SUPPORT**


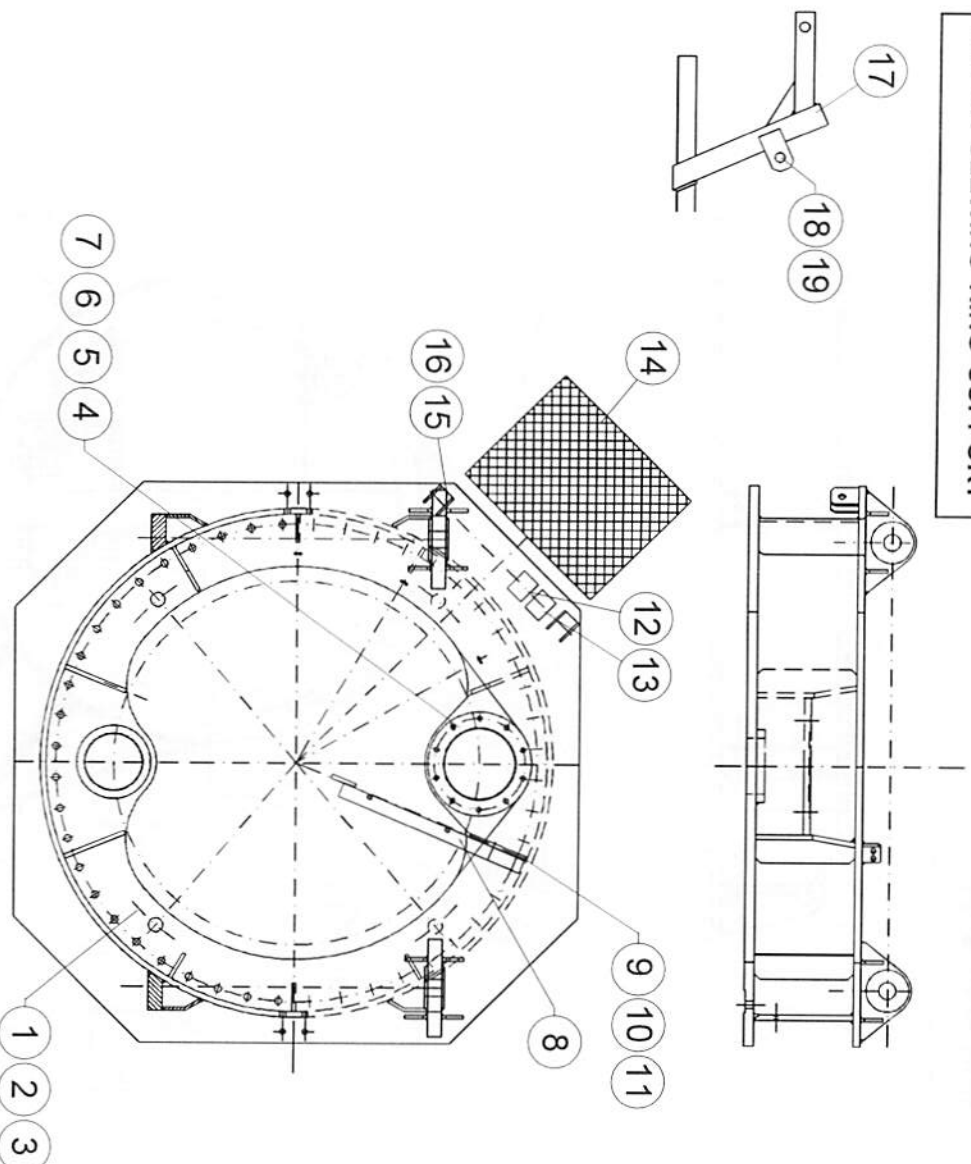
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
313523080			PORTARALLA INFERIORE (H20)	LOWER SLEWING RING SUPPORT		
1	880234010	48	VITE TCEI M24 x 160 N - CL.10.9	SCREW		
2	881736004	48	RONDELLA M24 N - C50	WASHER		
3	881224006	48	DADO ALTO M24 N - CL.10	TALL NUT		
4	880133115	4	VITE TEIF M14 x 50 Z - 8.8	SCREW		
5	881732006	4	RONDELLA M14 Z - 6.8	WASHER		
6	881224014	4	DADO ALTO M14 Z - CL. 10	TALL NUT		
7	326701005	1	SUPPORTO CAVI ALIMENTAZIONE	CABLES SUPPORT		
8	880133142	2	VITE TE M20 x 70 Z - 8.8	SCREW		
9	881732009	2	RONDELLA M20 Z - 6.8	WASHER		
10	881224018	2	DADO ALTO M20 Z - CL. 10	TALL NUT		

PORTARALLA INFERIORE (TS212)
LOWER SLEWING RING SUPPORT



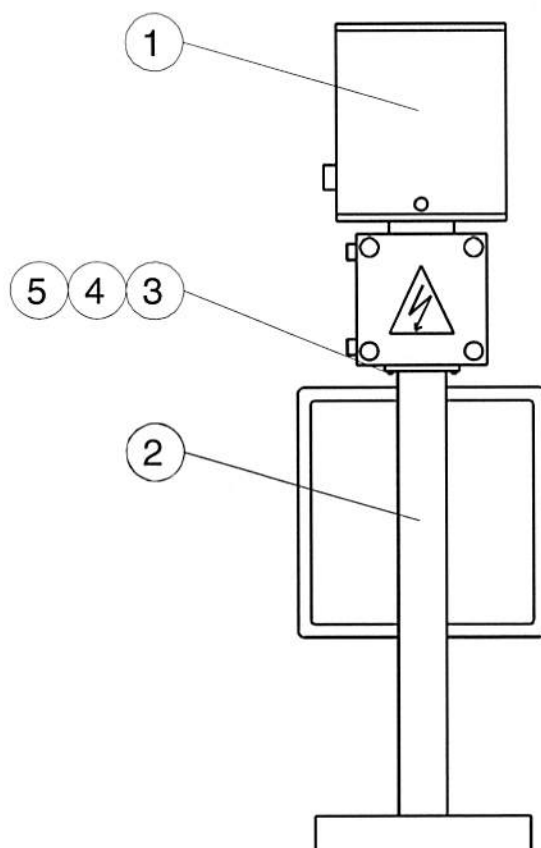
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
313540012			PORTARALLA INFERIORE (TS212)	LOWER SLEWING RING SUPPORT		
1	880234010	48	VITE TCEI M24 x 160 N - CL.10.9	SCREW		
2	881736004	48	RONDELLA M24 N - C50	WASHER		
3	881224006	48	DADO ALTO M24 N - CL.10	TALL NUT		
4	880133115	4	VITE TEIF M14 x 50 Z - 8.8	SCREW		
5	881732006	4	RONDELLA M14 Z - 6.8	WASHER		
6	881224014	4	DADO ALTO M14 Z - CL. 10	TALL NUT		
7	326701006	1	SUPPORTO CAVI ALIMENTAZIONE	CABLES SUPPORT		
8	880133126	2	VITE TE M16 x 50 Z - 8.8	SCREW		
9	881732007	2	RONDELLA M16 Z - 6.8	WASHER		
10	881224015	2	DADO ALTO M16 Z - CL. 10	TALL NUT		

**PORTARALLA SUPERIORE
UPPER SLEWING RING SUPPORT**



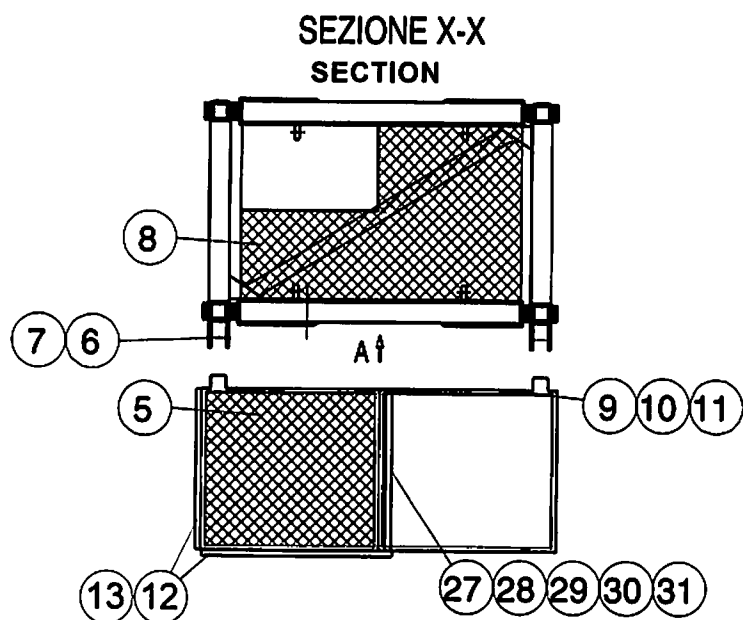
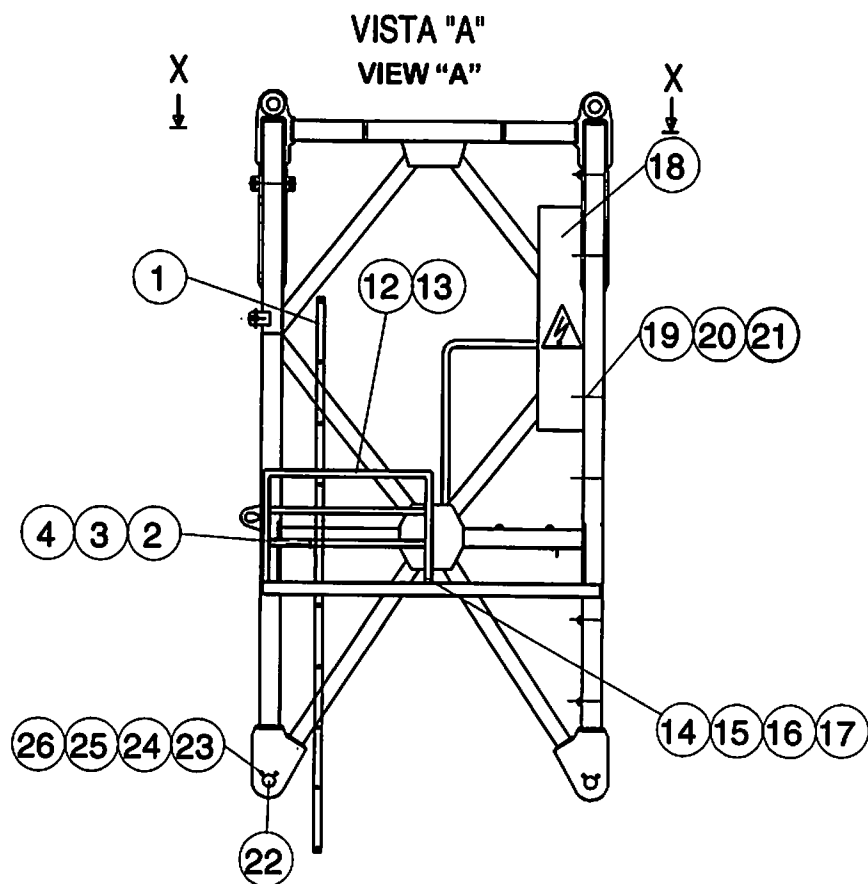
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
313702041			PORTARALLA SUPERIORE	UPPER SLEWING RING SUPPORT		
1	880234010	48	VITE TCEIM24 x 160 - 10,9 N	SCREW		
2	881736004	48	RONDELLA M24 C50 N	WASHER		
3	881224006	48	DADO ALTO M24 CL.10 N	TALL NUT		
4	880233045	20	VITE TCEIM16 x 80 Z - 8.8	SCREW		
5	881732007	20	RONDELLA M16 Z - 6.8	WASHER		
6	881224015	20	DADO ALTO M16 N - 10	TALL NUT		
7	880233044	6	VITE TCEIM16 x 60 Z - 8.8	SCREW		
8	326600050	1	BRACCIO ROTAZIONE COLLETTORE	SLIP RING SLEWING SUPPORT		
9	880133024	2	VITE TEPE M14 x 90 Z - 8.8	SCREW		
10	881732006	2	RONDELLA M14 Z - 6.8	WASHER		
11	881224014	2	DADO ALTO M14 Z - 10	TALL NUT		
12	850100037	1	TAB. 150 x 200 'PERICOLO CADUTA'	'FALLING HAZARD' PLATE		
13	850100038	1	TAB. 150 x 200 'OBBLIGO CINTURA'	'ATTACH SAFETY BELT' PLATE		
14	320301330	1	BALLATTOIO 500 x 680 TS21	PLATFORM		
15	380141119	2	SPINA 25 x 90	PIN		
16	883130002	4	COPIGLIA 6 x 60 Z - 4.8	SPLIT PIN		
17	326400047	1	SUPPORTO BALLATTOIO TS21	PLATFORM SUPPORT		
18	380141119	2	SPINA 25x90	PIN		
19	883130002	4	COPIGLIA 6x60 Z -4.8	SPLIT PIN		

**COMPLESSIVO COLLETTORE
SLIP RING UNIT**



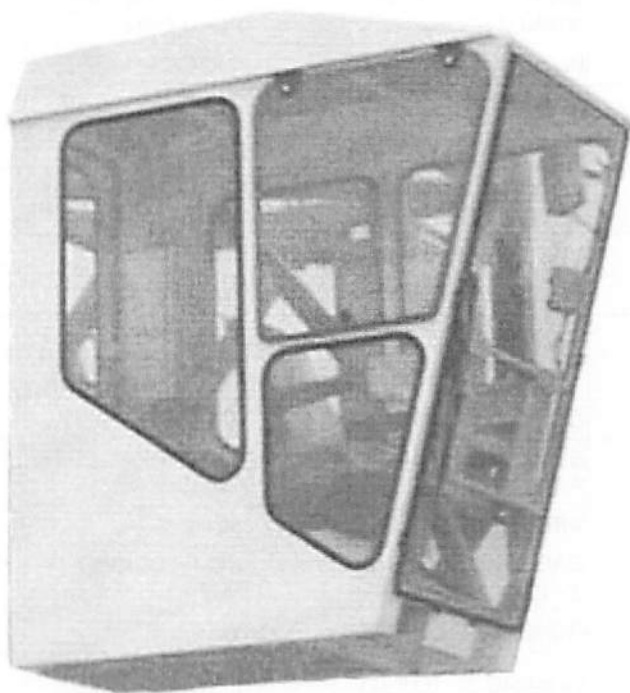
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
			COMPLESSIVO COLLETTORE	SLIP RING UNIT		
1	833499001	1	COLLETTORE CON CASSETTA ELETTRICA	SLIP RING WITH ELECTRICAL BOX		
2	326600060	1	SUPPORTO COLLETTORE	SLIP RING SUPPORT		
3	880133086	4	VITE TEIF M8 x 30 Z - 8.8	SCREW		
4	881732003	8	RONDELLA M8 Z - 6.8	WASHER		
5	881323001	4	DADO AUTOBLOCCANTE M8 Z - 8	SELF-LOCKING NUT		

**TRALICCIO CABINA
CAB TOWER SECTION**



POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
314002060			TRALICCIO CABINA	CAB TOWER SECTION		
1	321100450	1	SCALA INTERNA TRALICCIO CABINA	INTERNAL LADDER		
2	880133113	4	VITE TEIF M14 x 40 Z - 8.8	SCREW		
3	881732006	4	RONDELLA M14 Z - 6.8	WASHER		
4	881224014	4	DADO ALTO M14 Z - CL.10	TALL NUT		
5	320204060	1	BALLATOIO CABINA STANDARD	STANDARD CAB PLATFORM		
	320204080	1	BALLATOIO CABINA "LX"	"LX" CAB PLATFORM		
6	380141067	2	SPINA CS 30 x 125	PIN		
7	883130004	4	COPIGLIA 8 x 70 Z - 4.8	SPLIT PIN		
8	320104040	1	BALLATOIO TRALICCIO CABINA + BOTOLA	PLATFORM + MANHOLE COVER		
9	880133043	8	VITE TEPF M18 x 60 Z - 8.8	SCREW		
10	881837008	8	ROND. GROW M18 Z - C70	WASHER		
11	881224017	8	DADO ALTO M18 Z - CL.10	TALL NUT		
12	320602210	2	PARAPETTO 1534 x 1020	SAFETY RAIL		
13	883130002	4	COPIGLIA 6 x 60 - 4.8	SPLIT PIN		
14	325700001	4	SEMISTAFFA BLOCC. PARAPETTI	SAFETY RAIL LOCK BRACKET		
15	880133008	2	VITE TEPF M10 x 65 Z - 8.8	SCREW		
16	881323002	2	DADO AUTOBLOC. ALTO M10 Z - CL.8	SELF-LOCKING NUT		
17	881732004	2	RONDELLA M10 Z - 6.8	WASHER		
18	330108009-3	1	QUADRO EL. (Q.E.G.)	(Q.E.G.) ELECTRICAL BOX		
19	880133086	4	VITE TEIF M8 x 30 Z - 8.8	SCREW		
20	881732003	4	RONDELLA M8 Z - 6.8	WASHER		
21	881323001	4	DADO AUTOBLOC. M8 Z - CL.8	SELF-LOCKING NUT		
22	380343034	4	SPINA PS 70 x 180	PIN		
23	383401003	8	PIASTRA FERMO SPINA 40x10	PIN LOCK PLATE		
24	880133121	16	VITE TEIF M16 x 40 Z - 8.8	SCREW		
25	881732007	16	RONDELLA M16 Z - 6.8	WASHER		
26						
27*	320500050	1	PARAP. CHIUSURA BALL. CAB. (GRU SENZA CABINA)	SAFETY RAIL		
28*	325700001	8	STAFFA BLOCCAGGIO PARAPETTI	SAFETY RAIL LOCK BRACKET		
29*	880133008	4	VITE TEPF M10 x 65 Z - 8.8	SCREW		
30*	881323002	4	DADO AUTOBL. ALTO M10 Z	SELF-LOCKING NUT		
31*	881732004	4	RONDELLA M10 Z	WASHER		
* PARTICOLARI DA MONTARE SOLAMENTE NEL CASO IN CUI LA GRU VENGA FORNITA SENZA CABINA						
* PARTS TO BE ASSEMBLED ONLY ON CRANE SUPPLIED WITHOUT CAB						

CABINA STANDARD
STANDARD CAB



PER INFORMAZIONI SULLA CABINA STANDARD, CONSULTARE UFFICIO TECNICO COMEDIL.

FOR INFORMATION ABOUT **STANDARD CAB**, CONSULT COMEDIL'S TECHNICAL DEPARTMENT.

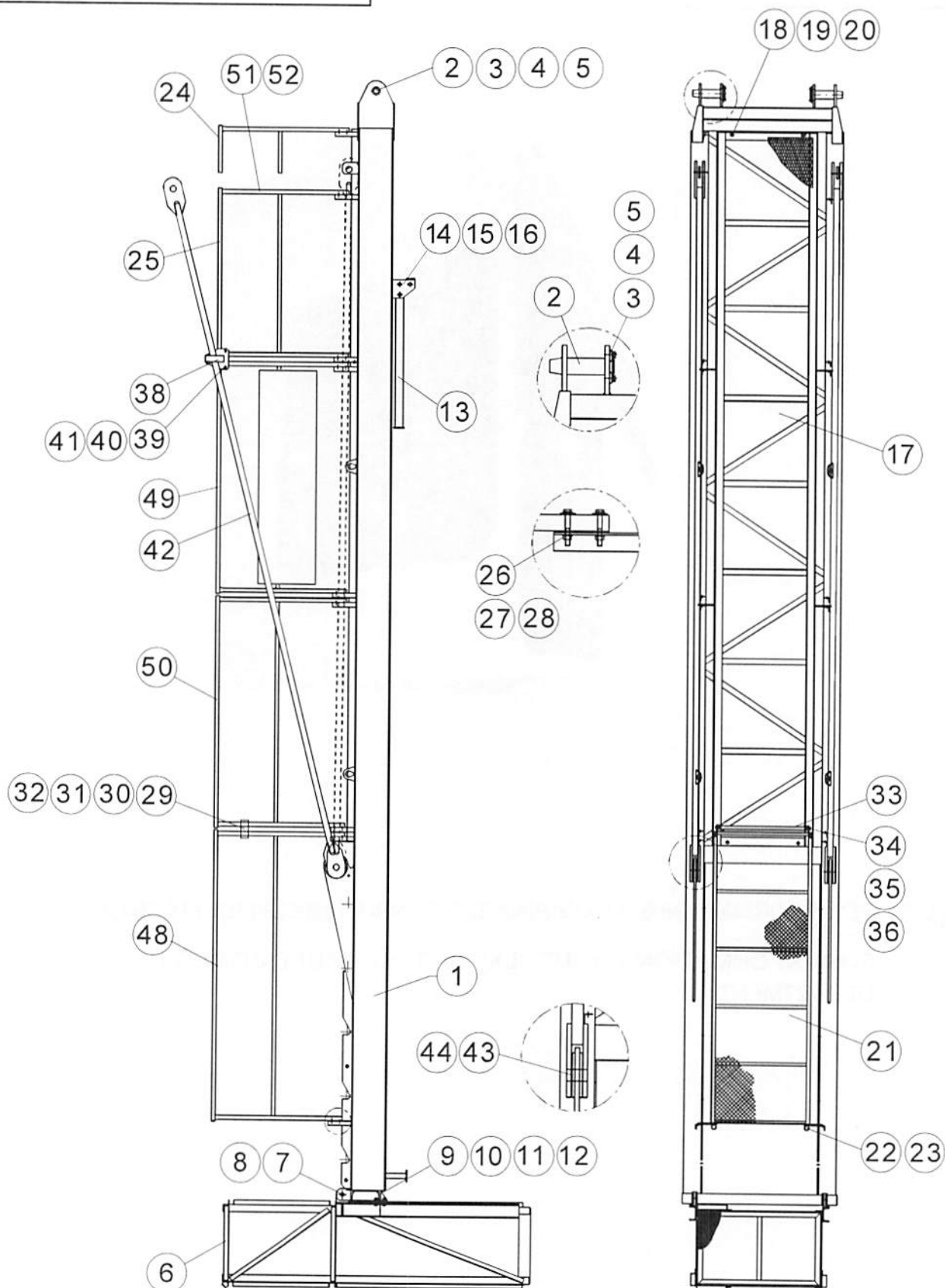
CABINA "LX"

"LX" CAB



PER INFORMAZIONI SULLA CABINA "LX", CONSULTARE UFFICIO TECNICO COMEDIL.
FOR INFORMATION ABOUT "LX" CAB, CONSULT COMEDIL'S TECHNICAL
DEPARTMENT.

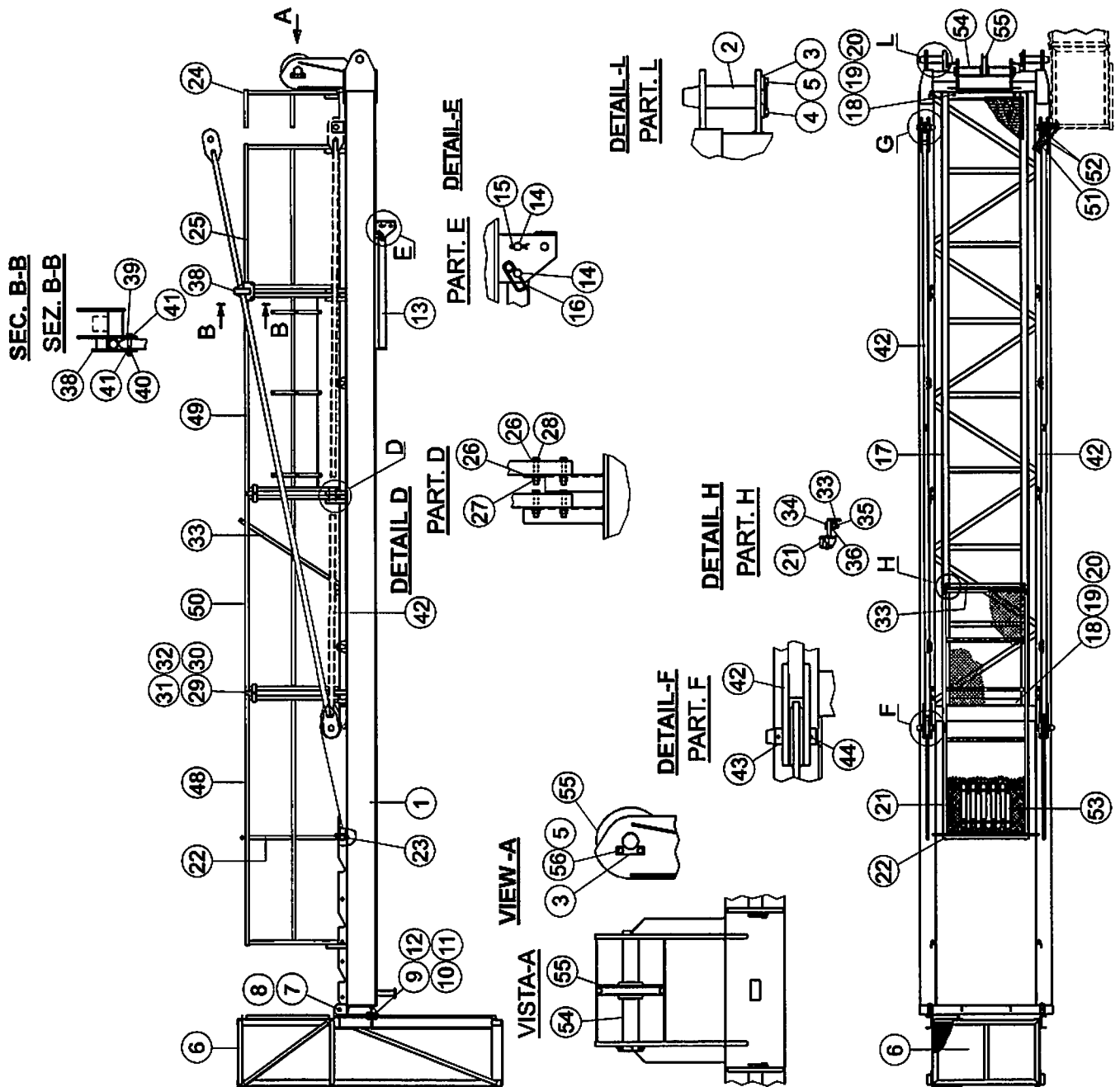
**CONTROBRACCIO STD
STD COUNTERJIB**



POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
214316040			CONTROBRACCIO STD	COUNTERJIB STD		
1	314316040	1	CONTROBRACCIO	COUNTERJIB		
2	380358001	2	SPINA PS 70 x 210	PIN		
3	383401003	2	FERMO SPINA 40x10	PIN LOCK PLATE		
4	880133175	4	VITE TE 16x35 -8.8	SCREW		
5	881732007	4	RONDELLA PIANA M16 -6.8	PLANE WASHER		
6	314316002	1	CESTO PORTA ZAVORRA CONTROBRACCIO	BALLAST BASKET		
7	380241032	2	SPINA T 30 x 55	PIN		
8	883130004	2	COPIGLIA 8 x 70 Z - 4.8	SPLIT PIN		
9	880133126	4	VITE TE M16 x 50 Z - 8.8	SCREW		
10	382406003	4	PIASTRINA A CUNEO	WEDGE PLATE		
11	881224015	4	DADO ALTO M16 Z - CL.10	TALL NUT		
12	881732007	4	RONDELLA PIANA M16 Z - 6.8	PLANE WASHER		
13	414316001	2	SUPPORTO CONTROBRACCIO	COUNTERJIB SUPPORT		
14	380141035	4	SPINA C 25 x 110	PIN		
15	883130002	10	COPIGLIA 6 x 60	SPLIT PIN		
16	883100002	2	COPIGLIA A MOLLA D6	SPRING SPLIT PIN		
17	320101410	1	BALLATOIO CONTROBRACCIO	PLATFORM		
18	880133102	10	VITE TEIF M12 x 35 - 8.8	SCREW		
19	881224013	10	DADO ALTO M12 - CL.10	TALL NUT		
20	881732005	10	RONDELLA PIANA M12 - 6.8	PLANE WASHER		
21	320201510	1	BALLATOIO SCORREVOLE CONTROBRACCIO	SLIDING PLATFORM		
22	320602170	1	PARAPETTO 1084 x 860	SAFETY RAIL		
23	883130002	2	COPIGLIA 6 x 60	SPLIT PIN		
24	320602160	1	PARAPETTO 2000 x 934	SAFETY RAIL		
25	320602150	1	PARAPETTO 1460 x 934	SAFETY RAIL		
26	881732004	64	RONDELLA PIANA M10 - 6.8	PLANE WASHER		
27	881023002	32	DADO MEDIO M10 - 8	MEAN NUT		
28	880133212	32	VITE TEIF M10 x 60 Z - 8.8	SCREW		
29	325700001	12	STAFFA BLOCCAGGIO PARAPETTI	SAFETY RAIL LOCK BRACKET		
30	880133008	6	VITE TEPF M10 x 65 Z - 8.8	SCREW		
31	881323002	6	DADO AUTOBLOCCANTE ALTO M10 - 8	SELF-LOCKING NUT		
32	881732004	6	RONDELLA M10 Z	WASHER		
33	329000010	1	MANIGLIA PER BALLATOIO SCORREVOLE	HANDLE		
34	880133102	2	VITE TEIF M12 x 35 - 8.8	SCREW		
35	881323003	2	DADO AUTOBLOCCANTE ALTO M12 - CL.10	SELF-LOCKING NUT		
36	881732005	2	RONDELLA PIANA M12 - 6.8	PLANE WASHER		
38	326400072	2	SUPPORTO TIRANTI CONTROBRACCIO	TIE-BAR SUPPORT		
39	880133008	4	VITE TEPF M10 x 65 Z - 8.8	SCREW		
40	881323002	4	DADO AUTOBLOCCANTE M10 Z -8	SELF-LOCKING NUT		

POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
214318040			CONTROBRACCIO STD	COUNTERJIB STD		
41	881732004	4	RONDELLA M10 Z - 6.8	WASHER		
42	315116050	2	TIRANTE CONTROBRACCIO "E"	"E" TIE-BAR		
43	380158002	4	SPINA CS 50 x 110	PIN		
44	883130005	8	COPIGLIA 8 x 100 Z - 4.8	SPLIT PIN		
45	880133102	2	VITE TEIF M12 x 35 Z - 8.8	SCREW		
46	881732005	2	RONDELLA PIANA M12 Z - 6.8	PLANE WASHER		
47	881323003	2	DADO ALTO M12 Z - CL.8	TALL NUT		
48	320602470	2	PARAPETTO 2500x934	SAFETY RAIL		
49	320602580	2	PARAPETTO 2000x934 (LOGO)	SAFETY RAIL (LOGO)		
50	320602590	2	PARAPETTO 1970x934	SAFETY RAIL		
51	850902001	1	CATENA G 22 5,5x35x20	CHAIN		
52	859900015	2	MOSCHETTONE MM80	SPRING CATCH		

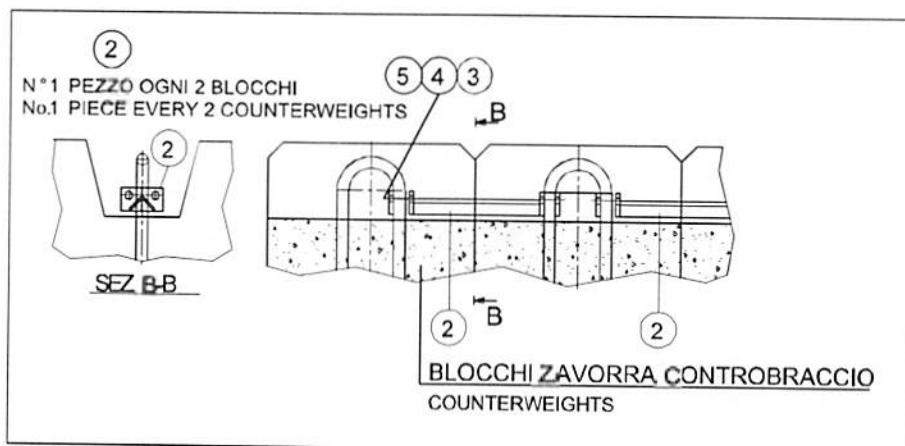
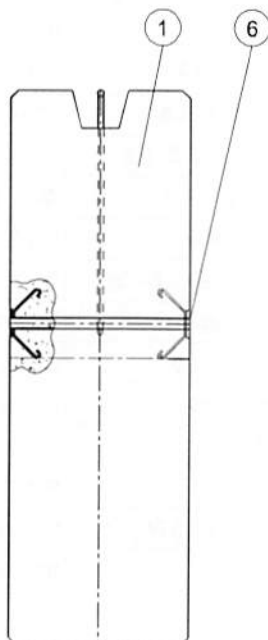
CONTROBRACCIO PULEGGIA SCORREVOLE
SMOOTH PULLEY COUNTERJIB



POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
214316041			CONTROBRACCIO PULEGGIA SCORREVOLE	SMOOTH PULLEY COUNTERJIB		
1	314316041	1	CONTROBRACCIO	COUNTERJIB		
2	380358001	2	SPINA PS 70 x 210	PIN		
3	383401003	3	FERMO SPINA 40x10	PIN LOCK PLATE		
4	880133175	4	VITE TE 16x35 -8.8	SCREW		
5	881732007	6	RONDELLA PIANA M16 -6.8	PLANE WASHER		
6	314316002	1	CESTO PORTA ZAVORRA CONTROBRACCIO	BALLAST BASKET		
7	380241032	2	SPINA T 30 x 55	PIN		
8	883130004	2	COPIGLIA 8 x 70 Z - 4.8	SPLIT PIN		
9	880133126	4	VITE TE M16 x 50 Z - 8.8	SCREW		
10	382406003	4	PIASTRINA A CUNEO	WEDGE PLATE		
11	881224015	4	DADO ALTO M16 Z - CL.10	TALL NUT		
12	881732007	4	RONDELLA PIANA M16 Z - 6.8	PLANE WASHER		
13	414316001	2	SUPPORTO CONTROBRACCIO	COUNTERJIB SUPPORT		
14	380141035	4	SPINA C 25 x 110	PIN		
15	883130002	10	COPIGLIA 6 x 60	SPLIT PIN		
16	883100002	2	COPIGLIA A MOLLA D6	SPRING SPLIT PIN		
17	320101410	1	BALLATOIO CONTROBRACCIO	PLATFORM		
18	880133102	10	VITE TEIF M12 x 35 - 8.8	SCREW		
19	881224013	10	DADO ALTO M12 - CL.10	TALL NUT		
20	881732005	10	RONDELLA PIANA M12 - 6.8	PLANE WASHER		
21	320201510	1	BALLATOIO SCORREVOLE CONTROBRACCIO	SLIDING PLATFORM		
22	320602170	1	PARAPETTO 1084 x 860	SAFETY RAIL		
23	883130002	2	COPIGLIA 6 x 60	SPLIT PIN		
24	320602160	1	PARAPETTO 2000 x 934	SAFETY RAIL		
25	320602150	1	PARAPETTO 1460 x 934	SAFETY RAIL		
26	881732004	64	RONDELLA PIANA M10 - 6.8	PLANE WASHER		
27	881023002	32	DADO MEDIO M10 - 8	MEAN NUT		
28	880133212	32	VITE TEIF M10 x 60 Z - 8.8	SCREW		
29	325700001	8	SEMISTAFFA BLOCCAGGIO PARAPETTI	SAFETY RAIL LOCK BRACKET		
30	880133008	8	VITE TEPF M10 x 65 Z - 8.8	SCREW		
31	881323002	8	DADO AUTOBLOCCANTE ALTO M10 - 8	SELF-LOCKING NUT		
32	881732004	8	RONDELLA M10 Z	WASHER		
33	329000010	1	MANIGLIA PER BALLATOIO SCORREVOLE	HANDLE		
34	880133102	2	VITE TEIF M12 x 35 - 8.8	SCREW		
35	881323003	2	DADO AUTOBLOCCANTE ALTO M12 - CL.10	SELF-LOCKING NUT		
36	881732005	2	RONDELLA PIANA M12 - 6.8	PLANE WASHER		
38	326400072	2	SUPPORTO TIRANTI CONTROBRACCIO	TIE-BAR SUPPORT		
39	880133008	4	VITE TEPF M10 x 65 Z - 8.8	SCREW		
40	881323002	4	DADO AUTOBLOCCANTE M10 Z - 8	SELF-LOCKING NUT		

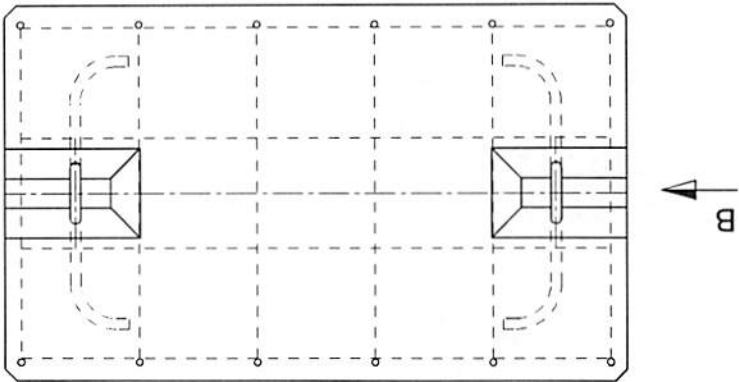
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
214316041			CONTROBRACCIO PULEGGIA SCORREVOLE	SMOOTH PULLEY COUNTERJIB		
41	881732004	4	RONDELLA M10 Z - 6.8	WASHER		
42	315116050	2	TIRANTE CONTROBRACCIO "E"	"E" TIE-BAR		
43	380158002	4	SPINA CS 50 x 110	PIN		
44	883130005	8	COPIGLIA 8 x 100 Z - 4.8	SPLIT PIN		
45	880133102	2	VITE TEIF M12 x 35 Z - 8.8	SCREW		
46	881732005	2	RONDELLA PIANA M12 Z - 6.8	PLANE WASHER		
47	881323003	2	DADO ALTO M12 Z - CL.8	TALL NUT		
48	320602470	2	PARAPETTO 2500x934	SAFETY RAIL		
49	320602580	2	PARAPETTO 2000x934 (LOGO)	SAFETY RAIL (LOGO)		
50	320602580	2	PARAPETTO 1970x934	SAFETY RAIL		
51	850902001	1	CATENA G 22 5,5x35x20	CHAIN		
52	859900015	2	MOSCHETTONE MM80	SPRING CATCH		
53	380817009	10	SPINA S 50x360	PIN		
54	380034217	1	SPINA PS 80x580	PIN		
55	350238001	1	PULEGGIA BR 340-80-48 R6	PULLEY		
56	880133119	2	VITE TE 16x30 cl.8.8	SCREW		

CONTRAPPESO "A"
COUNTERWEIGHT "A"

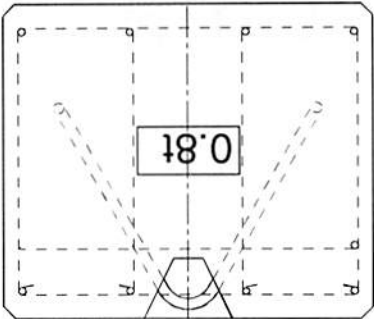


POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
390107011			CONTRAPPESO "A"	COUNTERWEIGHT		
1	390107011	4	CONTRAPPESO "A"	"A" COUNTERWEIGHT		
2	391001050	1 *	STAFFA BLOCC. CONTRAPPESO "A"	LOCK BRACKET		
3	880133130	4 *	VITE TEF M16 x 110 Z - 8.8	SCREW		
4	881732007	4 *	RONDELLA M16 Z - 6.8	WASHER		
5	881224015	4 *	DADO ALTO M16 Z - CL.10	TALL NUT		
6	380817009	8	SPINA S 50 x 360	PIN		
*QUANTITA' VALIDE PER NR. 1 STAFFA / QUANTITY REQUIRED FOR NO. 1 BRACKET						

CONTRAPPESO "B"
COUNTERWEIGHT "B"

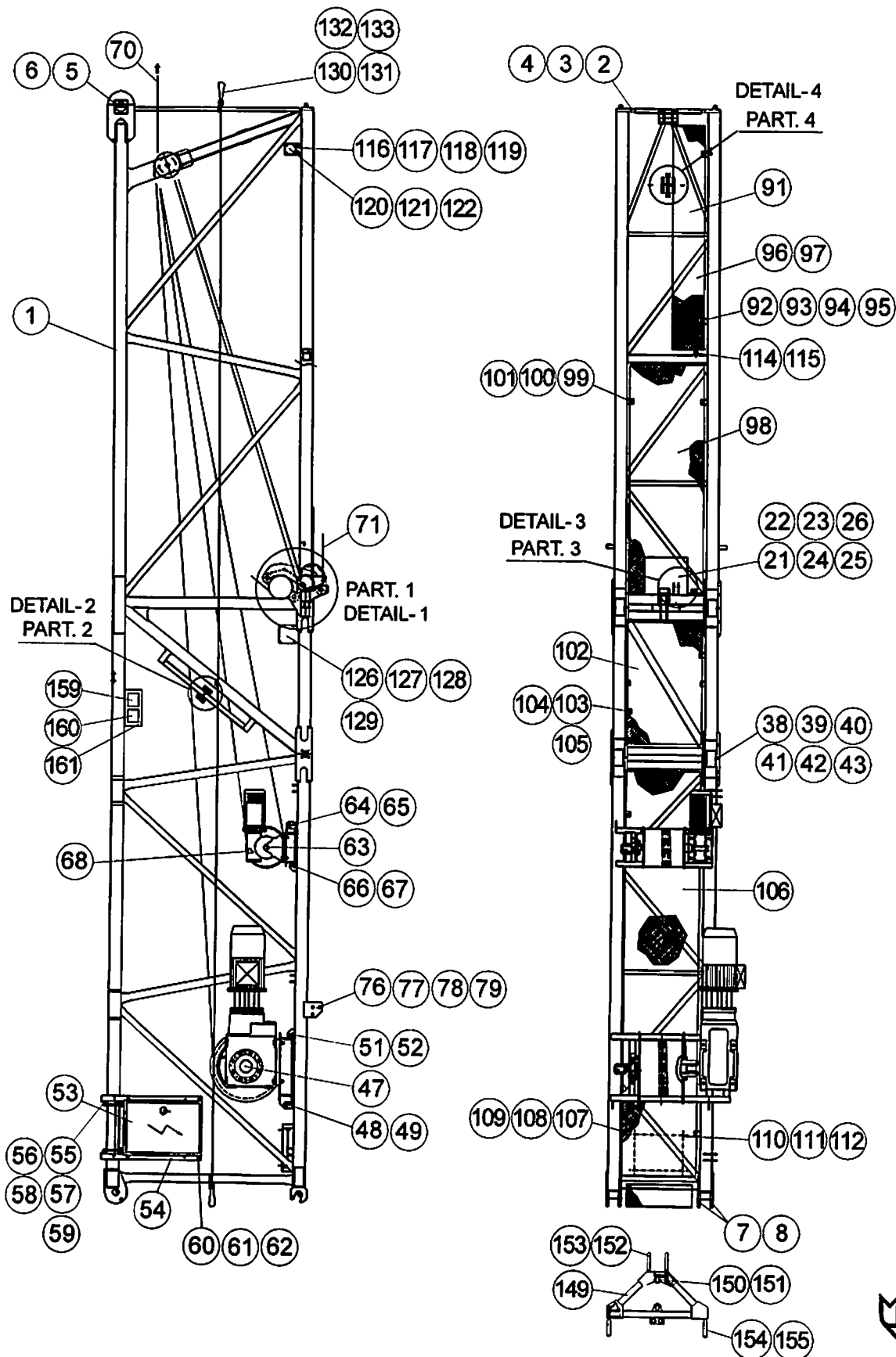


VISTA B
VIEW B

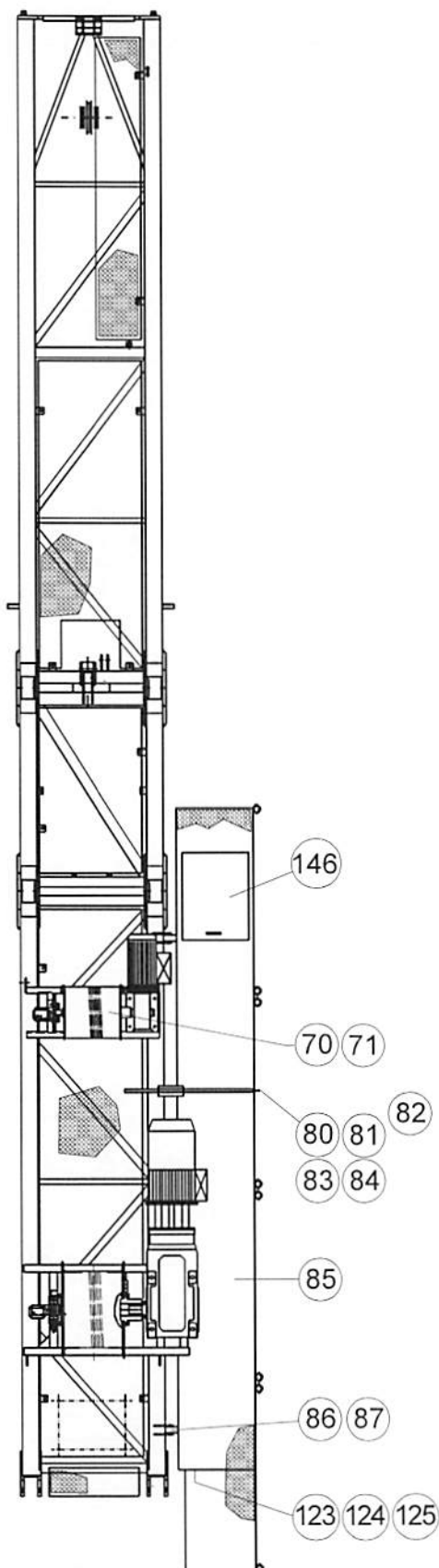


POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
1	390107012		CONTRAPPESO "B"	COUNTERWEIGHT		
	390107012	5	CONTRAPPESO "B"	"B" COUNTERWEIGHT		

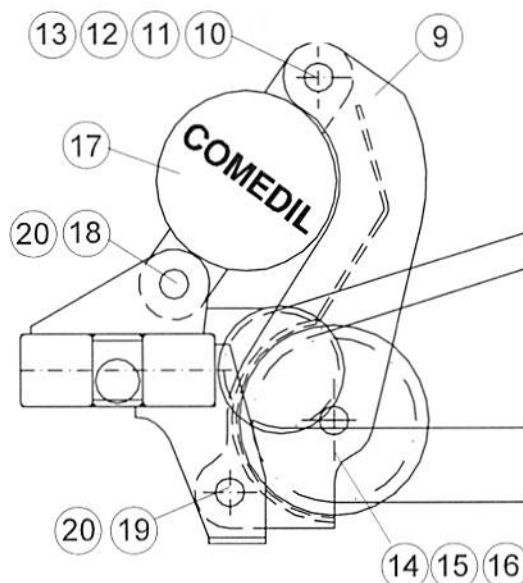
**TRONCO BRACCIO-22 STD / F11
JIB SECTION-22 STD / F11**



TRONCO BRACCIO-22 STD / F11
JIB SECTION-22 STD / F11

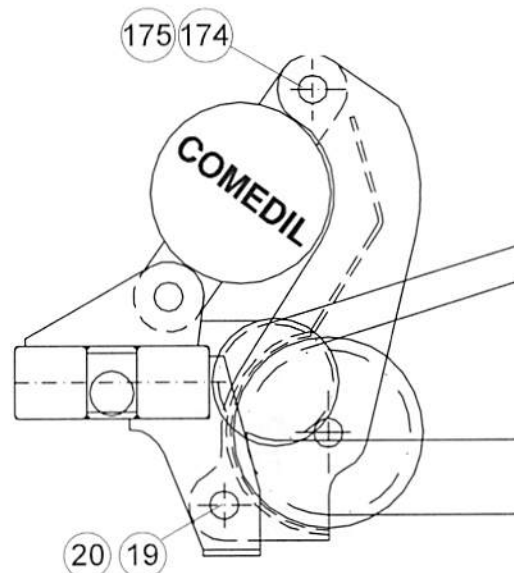


DETAIL- 1
 PART. 1



GRU CON "ICS" (Integrated Control System)
 CRANE WITH "ICS" (Integrated Control System)

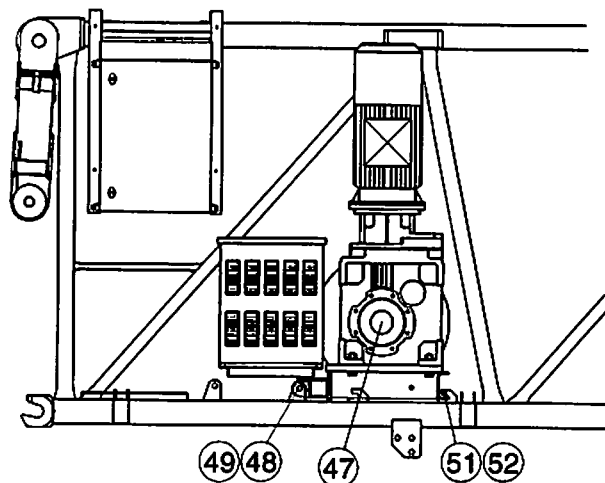
PART. 1
 DETAIL- 1



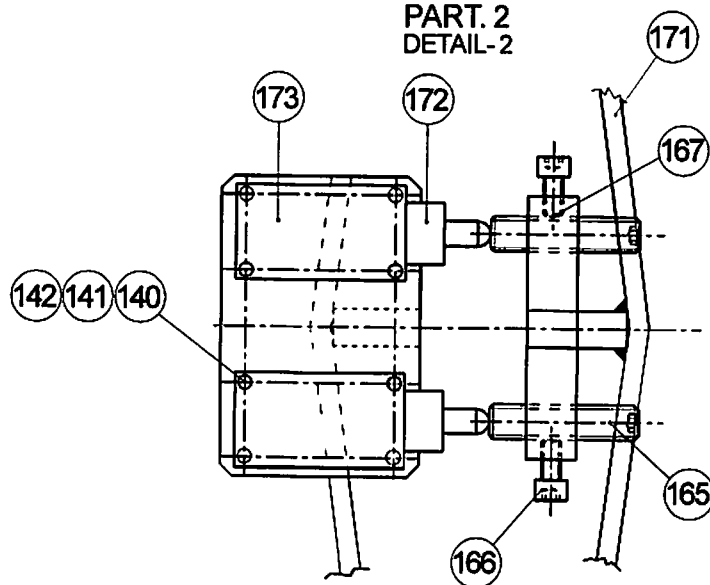
GRU SENZA "ICS" (Integrated Control System)
 CRANE WITHOUT "ICS" (Integrated Control System)

**TRONCO BRACCIO-22 STD / F11
JIB SECTION-22 STD / F11**

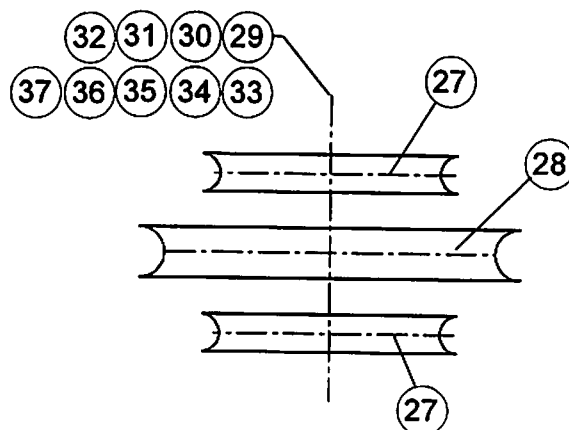
**TRONCO BRACCIO-22 CON ARGANO SOLLEVAMENTO 30 AFC 40 F11
JIB SECTION-22 WITH 30 AFC 40 F11 HOIST WINCH**



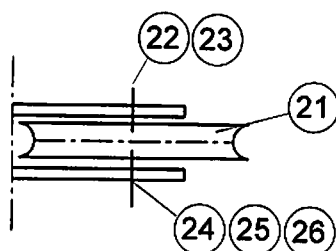
**PART. 2
DETAIL-2**



**DETAIL-4
PART. 4**



**DETAIL-3
PART. 3**



POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
	214516220 214516002		TRONCO BRACCIO-22 STD TRONCO BRACCIO-22 F11	JIB SECTION-22 STD JIB SECTION-22 F11		
1	314516220-1	1	TRONCO BRACCIO-22	JIB SECTION-22		
2	880133143	2	VITE TEIF M20x80 -8.8	SCREW		
3	881732009	2	RONDELLA M20 -6.8	WASHER		
4	881323006	2	DADO AUTOBLOC. M20 -8	SELF-LOCKING NUT		
5	380158001	1	SPINA CS 100x305	PIN		
6	883130008	2	COPIGLIA 13x120	SPLIT PIN		
7	384233005	4	VITE TEIF SPEC. M16x100 -8.8	SCREW		
8	881024003	4	DADO MEDIO M16	MEAN NUT		
9	226404001	1	SUPPORTO LIMITATORE DI CARICO	RATED CAPACITY LIMITER SUPPORT		
10	832609001	1	CELLA DICARICO	LOAD CELL		
11	383400002	1	FERMO SPINA 25x6	PIN LOCK PLATE		
12	881732003	2	RONDELLA M8 -6.8	WASHER		
13	880133084	2	VITE TEIF M8x20 -8.8	SCREW		
14	346200045	3	CARTER	COVER		
15	881732003	6	RONDELLA M8 -6.8	WASHER		
16	880133082	6	VITE TEIF M8x16	SCREW		
17	217001011	1	ANELLO DINAMOMETRICO	LOAD LIMITER		
18	380141051	1	SPINA C 40x90	PIN		
19	380141047	1	SPINA C 40x130	PIN		
20	883130004	4	COPIGLIA 8x70	SPLIT PIN		
21	350225002	1	PULEGGIA 176 34 26 R 4.2	PULLEY		
22	382517007	2	DISTANZIALE Ø40x30,3 SP. 2,5	SPACER		
23	380341014	1	SPINA PS 30x66	PIN		
24	880133092	2	VITE TEIF M10x16 -8.8	SCREW		
25	881732004	2	RONDELLA M20 -6.8	WASHER		
26	383401001	1	FERMO SPINA 25x6	PIN LOCK PLATE		
27	350225001	2	PULEGGIA 176 34 26 R 4,2	PULLEY		
28	350224001	1	PULEGGIA 264 49 35 R 6,5	PULLEY		
29	382606110	2	DISTANZIALE Ø50x40,3 SP. 4	SPACER		
30	382517007	1	DISTANZIALE Ø40x30,3 SP. 2,5	SPACER		
31	381743020	1	PERNO FILETT. M24x40x83	THREADED PIN		
32	880133092	2	VITE TEIF M10x16	SCREW		
33	881732004	2	RONDELLA M10	WASHER		
34	383401001	1	FERMO SPINA 25x6	PIN LOCK PLATE		
35	881732010	1	RONDELLA M24	WASHER		
36	881124005	2	DADO BASSO M24	NUT		
37	883130001	1	COPIGLIA 4x40 1336 Z	SPLIT PIN		
38	380343035	4	SPINA PS Ø70x270	PIN		
39	383401003	8	FERMO SPINA 40x10	PIN LOCK PLATE		
40	881732005	8	RONDELLA M12	WASHER		
41	880133100	8	VITE TEIF M12x25	SCREW		
42	880133106	8	VITE TEIF M12x60	SCREW		
43	881224013	8	DADO ALTO M12	TALL NUT		
44						
45						
46						
47	240471010	1	ARGANO SOLL. 30AFC40 F12	HOIST WINCH		
	240471030	1	ARGANO SOLL. 30AFC40 F11	HOIST WINCH		
48	380141121	2	SPINA C 25x50 (30AFC40 F12)	PIN		
	380141102	2	SPINA C 25x60 (30AFC40 F11)	PIN		
49	883130002	4	COPIGLIA 6x60 1336 Z	SPLIT PIN		
50						
51	880133123	2	VITE TEIF M16x65	SCREW		



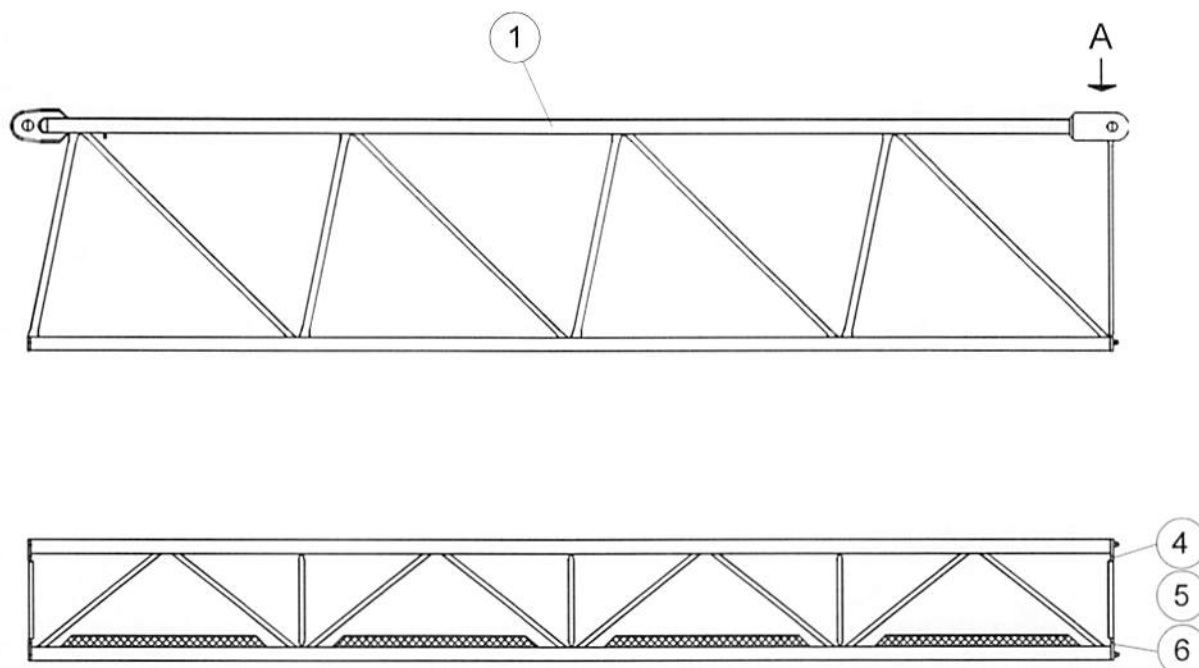
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
	214516220		TRONCO BRACCIO-22 STD	JIB SECTION-22 STD		
	214516002		TRONCO BRACCIO-22 F11	JIB SECTION-22 F11		
52	881023005	2	DADO MEDIO M16	MEAN NUT		
53	330704001-1	1	QUA.EL (QES) B 30AF E1 UU	(QES) ELECTRICAL BOX		
54	326500016-1	1	TELAIO PER Q.E.S.	Q.E.S FRAME		
55	880133121	2	VITE TEIF M16x40	SCREW		
56	881732007	2	RONDELLA M16	WASHER		
57	881023005	10	DADO MEDIO M16	MEAN NUT		
58	881124002	8	DADO BASSO M16	FLAT NUT		
59	880900044	4	BARRA FIL. M16 Z	THREADED BAR		
60	880133086	4	VITE TEIF M8x30	SCREW		
61	881732003	4	RONDELLA M8	WASHER		
62	881323001	4	DADO AUTOBLOC. M8	SELF LOCKING NUT		
63	242466030	1	ARGANO CARRELLO DVF 3 5	TROLLEY WINCH		
64	380141122	2	SPINA C 20x45	PIN		
65	883130002	4	COPIGLIA 6x60	SPLIT PIN		
66	880133123	2	VITE TEIF M16x65	SCREW		
67	881023005	2	DADO MEDIO M16	MEAN NUT		
68	883346007	4	MORSETTO 5/16 F7-8	ROPE CLAMP		
69						
70	860107015		FUNE CARRELLO Ø7 DSC-8 C.R.	TROLLEY ROPE		
71	860107021		FUNECARRELLO Ø7 DSC-8 C.R.	TROLLEY ROPE		
72	225001030	2	DISPOSITIVO BLOCCAGGIO FUNE CARRELLO	TROLLEY ROPE LOCK DEVICE		
73	880133103	4	VITE TEIF M12x40	SCREW		
74	881732005	4	RONDELLA M12	WASHER		
75	881224013	4	DADO ALTO M12	TALL NUT		
76	326400032	2	SUPPORTO TRONCO BRACCIO-20	JIB SECTION-20 SUPPORT		
77	380141120	4	SPINA C 25x165	PIN		
78	883200003	2	COPIGLIA R D 6 Z	SPLIT PIN		
79	883130002	6	COPIGLIA 6x60	SPLIT PIN		
80	326400033	1	SUPPORTO BALLATOIO	PLATFORM SUPPORT		
81	883600003	1	TENDITORE 0-0 M12 Z	EQUALIZER		
82	880133126	5	VITE TEIF M16x50	SCREW		
83	881323005	5	DADO AUTOBLOCCANTE M16	SELF-LOCKING NUT		
84	881732007	2	RONDELLA M16	WASHER		
85	320201190	1	BALLATOIO 600x6050	PLATFORM		
86	380241012	3	SPINA T 20x90	PIN		
87	883130002	3	COPIGLIA 6x60 1336 Z	SPLIT PIN		
88	880133143	2	VITE TE 8.8 5739 20X80 Z	SCREW		
89	881732009	2	RONDELLA M20	WASHER		
90	881323006	2	DADO AUTOBLOC. M20	SELF-LOCKING NUT		
91	320101510	1	BALLATOIO 350x2380	PLATFORM		
92	880900045	1	BARRA FIL. M12	THREADED BAR		

POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
	214516220 214516002		TRONCO BRACCIO-22 STD TRONCO BRACCIO-22 F11	JIB SECTION-22 STD JIB SECTION-22 F11		
93	880133103	2	VITE TEIF M12x40	SCREW		
94	881732005	6	RONDELLA M12	WASHER		
95	881323003	4	DADO AUTOBLOC. M12	SELF-LOCKING NUT		
96	318100050	1	CHIAVE PER TENDITORE FUNE CARRELLO	WRENCH FOR EQUALIZER		
97	883130001	1	COPIGLIA 4x40	SPLIT PIN		
98	320101500	1	BALLATOIO 800x2430	PLATFORM		
99	880133103	4	VITE TEIF M12x40	SCREW		
100	881732005	8	RONDELLA M12	WASHER		
101	881323003	4	DADO AUTOBLOC. M12	SELF-LOCKING NUT		
102	320101490	1	BALLATOIO 800x1300	PLATFORM		
103	880133103	2	VITE TEIF M12x40	SCREW		
104	881732005	4	RONDELLA M12	WASHER		
105	881323003	2	DADO AUTOBLOC. M12	SELF-LOCKING NUT		
106	320101480-1	1	BALLATOIO 800x4320	PLATFORM		
107	880133103	4	VITE TEIF M12x40	SCREW		
108	881732005	8	RONDELLA M12	WASHER		
109	881323003	4	DADO AUTOBLOC. M12	SELF-LOCKING NUT		
110	880133103	4	VITE TEIF M12x40	SCREW		
111	881732005	4	RONDELLA M12	WASHER		
112	881323003	4	DADO AUTOBLOC. M12	SELF-LOCKING NUT		
113	881023006	2	DADO MED CL8 M20 Z	NUT		
114	380841010	1	SPINA S 30x185	PIN		
115	883200003	1	COPIGLIA R D 6 Z	SPLIT PIN		
116	326400031	1	SUPP.DISP.POS.HOME CARRELLO CTT161-141	SUPPORT		
117	880133103	2	VITE TE 8.8 5739 12X40 Z	SCREW		
118	881732005	2	ROND PIANA 6.8 6592 M12 Z	WASHER		
119	881224013	2	DADO ALT CL10 5587 M12 Z	TALL NUT		
120	880130004	4	VITE TC 4.8 7687 5X50 TESTA A CROCE	SCREW		
121	881732001	4	ROND PIANA 6.8 6592 M5 Z	PLANE WASHER		
122	881023001	4	DADO MED CL8 5588 M5 Z	MEAN NUT		
123	880133139	2	VITE TE 8.8 5739 20X50 Z	SCREW		
124	881023006	2	DADO CL8 5588 M20 Z	NUT		
125	881732009	2	RONDELLE 6.8 M20	WASHER		
126	334401002	1	SI.VIS B IMPSEN003	VISUALIZATION SYSTEM		
127	880133170	4	VITE TE 8.8 5739 5X25 Z	SCREW		
128	881732001	4	ROND PIANA 6.8 6592 M5 Z	PLANE WASHER		
129	881023001	4	DADO MED CL8 5588 M5 Z	MEAN NUT		
130	860406001	2	FUNE V R23,3KN D.6 Z	ROPE		
131	859900034	2	MOSCHETTONE mm100	SPRING CATCH		
132	883600002	2	TENDITORE 0-0 M10 Z	EQUALIZER		

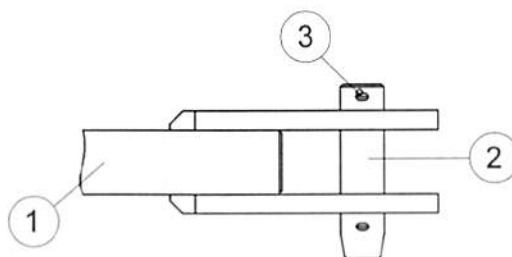


POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
	214516220 214516002		TRONCO BRACCIO-22 STD TRONCO BRACCIO-22 F11	JIB SECTION-22 STD JIB SECTION-22 F11		
133	883346002	8	MORSETTO 1/4 F. 6 Z	ROPE CLAMP		
134	831499014	1	RESISTOR FV OHM140 19kW INVERTER	RESISTOR		
135						
136						
137						
138						
139						
140	880130004	16	VITE TC 4.8 7687 5X50 TESTA A CROCE	SCREW		
141	881023001	16	DADO MEDIO CL8 M5 Z	MEAN NUT		
142	881732001	16	RONDELLA PIANA 6.8 6592 M5 Z	PLANE WASHER		
143	880133080	4	VITE TE 8.8 6X20 Z	SCREW		
144	881023011	4	DADO MEDIO CL8 M6 Z	MEAN NUT		
145	882201008	4	RONDELLA GREMB.M6 D.18	WASHER		
146	323000020	1	BOTOLA 475x680 BALL. T.B.	MANHOLE COVER		
147						
148						
149	315116020-1	1	TIRANTE "B" C.B.	TIE-BAR "B"		
150	380841012	1	SPINA S 30X205 C40B	PIN		
151	883200003	1	CHIAVISTELLO R D6 Z	SPRING SPLIT PIN		
152	380143040	1	SPINA CS 65X280	PIN		
153	883130007	2	COPIGLIA 4.8 13X110 Z	SPLIT PIN		
154	380143041	2	SPINA CS 50X110 38NCM4	PIN		
155	883130005	4	COPIGLIA 4.8 1336 8X100 Z	SPLIT PIN		
156						
157						
158	852100002	1	CAPOCORDA C/C 11-13 1/2"	SOCKET		
159	850100037	1	TAB.150X200 "PERICOLO CADUTA"	"FALLING HAZARD" PLATE		
160	850100038	1	TAB.150X200 "OBBLIGO CINTURA"	"ATTACH SAFETY BELT" PLATE		
161	892600001	1	MOUSSE ADESIVA 20X10	ADHESIVE PROTECTION		
162	883346001	1	MORSETTO 1/2 F12 Z	ROPE CLAMP		
163	225100080	2	GOLFARE SOLL.BRACCI CTT	EYEBOLT		
164	883346007	1	MORSETTO 5/16 F7-8 Z	ROPE CLAMP		
165	880435005	4	VITE ST M14x60 -12.9	SCREW		
166	880233009	4	VITE TC M8x16 Z -8.8	SCREW		
167	892000001	4	PIOMBINI	LEAD SEALS		
171	317116010	1	LIMITATORE DI MOMENTO	LOAD MOMENT LIMITER		
172	833001001	3	TESTA FINECORSO	LIMIT SWITCH HEAD		
173	832101001	3	CORPO FINECORSO	LIMIT SWITCH BODY		
174	380141046	1	SPINA C 40x100	PIN		
175	883130004	2	COPIGLIA 8x70	SPLIT PIN		

TRONCO BRACCIO-23
JIB SECTION-23

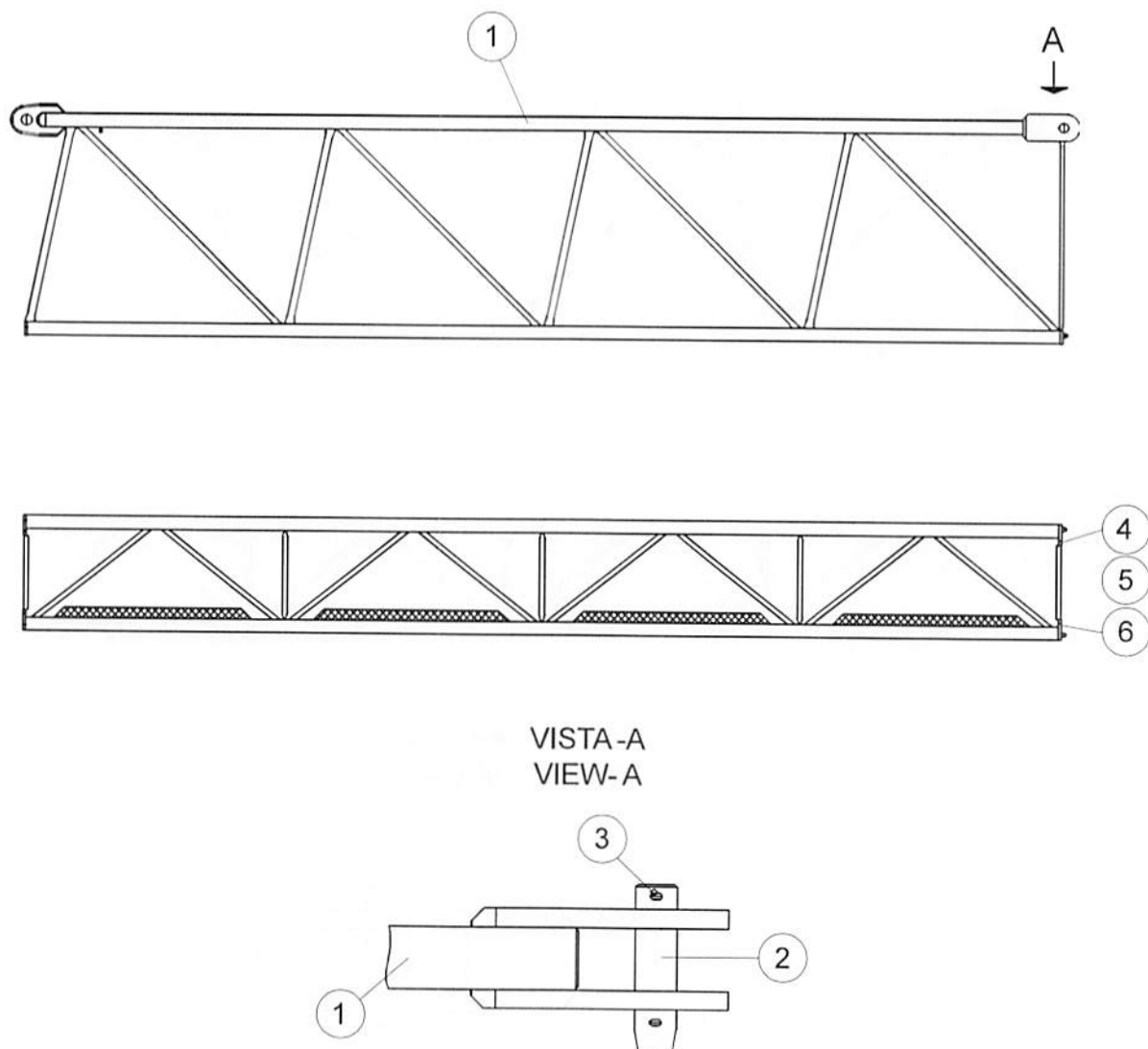


VISTA-A
VIEW-A



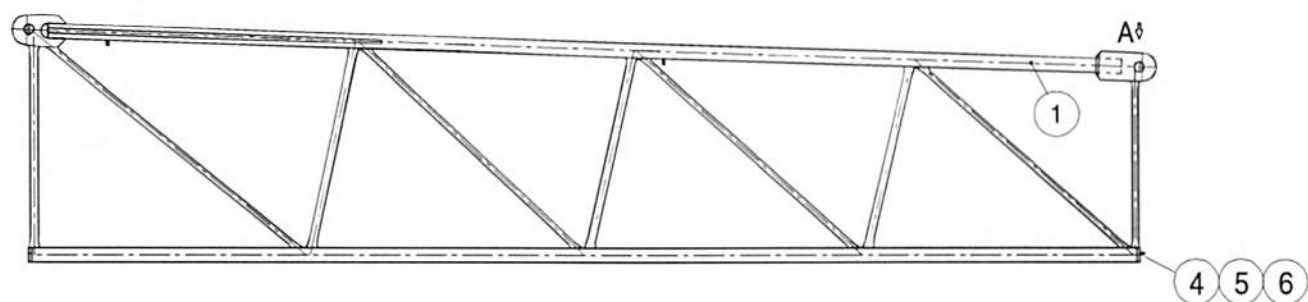
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
314616230			TRONCO BRACCIO-23	JIB SECTION-23		
1	314616230	1	TRONCO BRACCIO-23	JIB SECTION-23		
2	380141108	1	SPINA CS 90x245	PIN		
3	883130008	2	COPIGLIA 13x120	SPLIT PIN		
4	880133143	2	VITE TEIF M20x80	SCREW		
5	881323006	2	DADO AUTOBLOCCANTE M20	SELF-LOCKING NUT		
6	881732009	2	RONDELLA M20	WASHER		

TRONCO BRACCIO-24
JIB SECTION-24

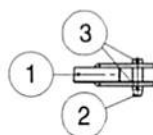


POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
314616240			TRONCO BRACCIO-24	JIB SECTION-24		
1	314616240	1	TRONCO BRACCIO-24	JIB SECTION-24		
2	380141109	1	SPINA CS85x230	PIN		
3	883130007	2	COPIGLIA 13x110	SPLIT PIN		
4	880133143	2	VITE TEIF M20x80	SCREW		
5	881323006	2	DADO AUTOBLOCCANTE M20	SELF-LOCKING NUT		
6	881732009	2	RONDELLA M20	WASHER		

TRONCO BRACCIO-25
JIB SECTION-25

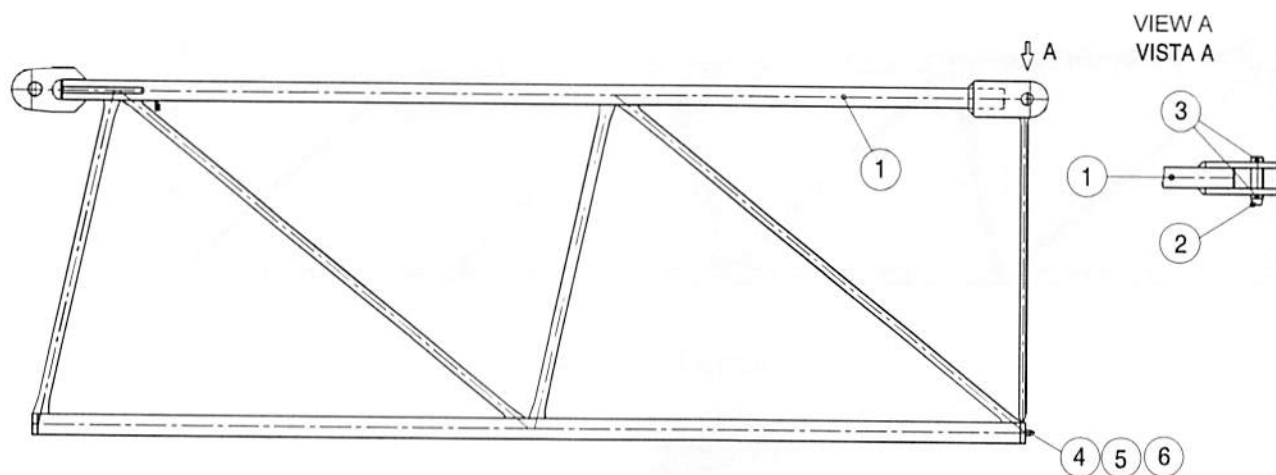


VISTA A - VIEW A



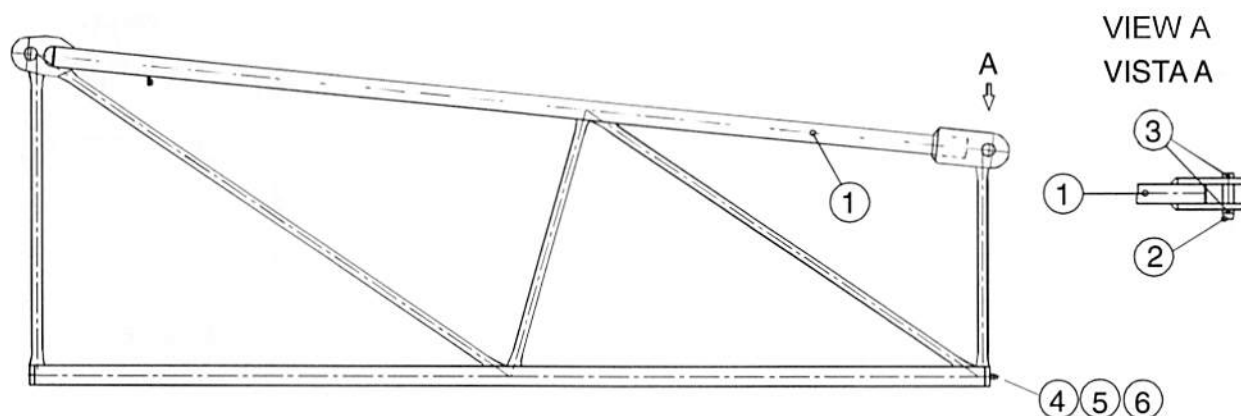
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
314616250			TRONCO BRACCIO-25	JIB SECTION-25		
1	314616250	1	TRONCO BRACCIO-25	JIB SECTION-25		
2	380141110	1	SPINA CS 70x185	PIN		
3	883130007	2	COPIGLIA 13 x 110 Z - 4.8	SPLIT PIN		
4	880133143	2	VITE TE 20 x 80 Z - 8.8	SCREW		
5	881323006	2	DADO AUTOBLOCCANTE M20 N - CL.8	SELF LOCKING NUT		
6	881732009	2	ROND. PIANA M20 Z - 6.8	PLANE WASHER		

TRONCO BRACCIO-5
JIB SECTION-5



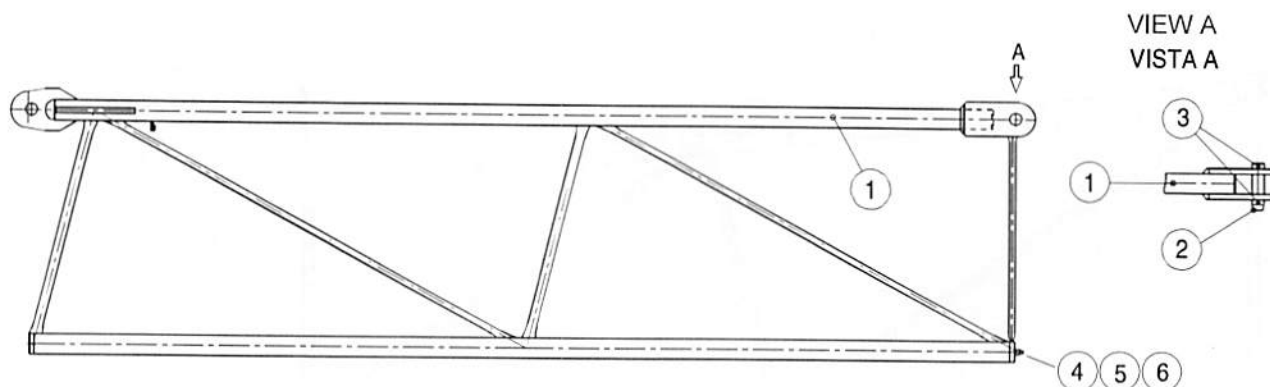
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
314616050			TRONCO BRACCIO-5	JIB SECTION-5		
1	314616050	1	TRONCO BRACCIO 5	JIB SECTION-5		
2	380141111	1	SPINA CS 60 x 180	PIN		
3	883130012	2	COPIGLIA 10 x 90 Z - 4.8	SPLIT PIN		
4	880133143	2	VITE TE 20 x 80 Z - 8.8	SCREW		
5	881323006	2	DADO AUTOBLOCCANTE M20 N - CL.8	SELF LOCKING NUT		
6	881732009	2	ROND. PIANA M20 Z - 6.8	PLANE WASHER		

TRONCO BRACCIO-6
JIB SECTION-6



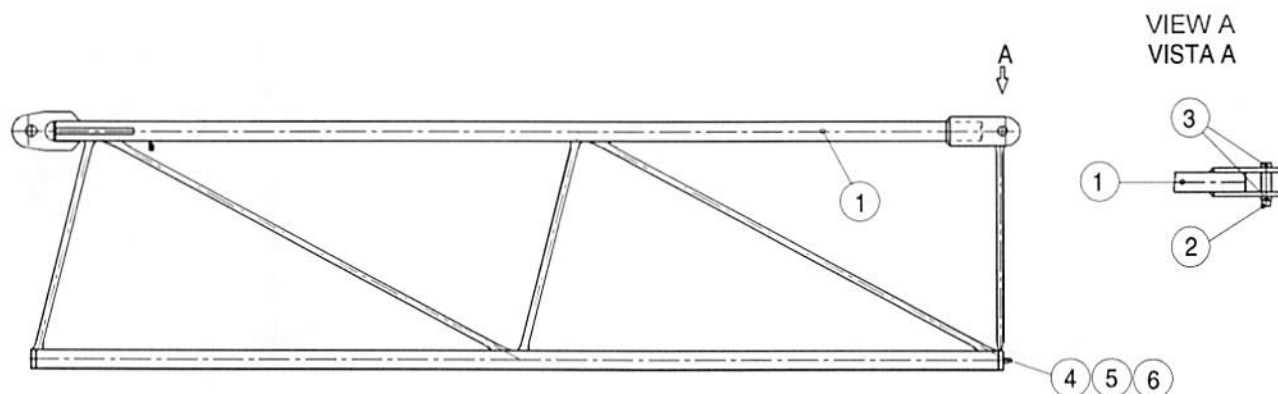
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
314616060-1			TRONCO BRACCIO-6	JIB SECTION-6		
1	314616060-1	1	TRONCO BRACCIO 6	JIB SECTION-6		
2	380141111	1	SPINA CS 60 x 180	PIN		
3	883130012	2	COPIGLIA 10 x 90 Z - 4.8	SPLIT PIN		
4	880133143	2	VITE TE 20 x 80 Z - 8.8	SCREW		
5	881323006	2	DADO AUTOBLOCCANTE M20 N - CL.8	SELF LOCKING NUT		
6	881732009	2	ROND. PIANA M20 Z - 6.8	PLANE WASHER		

TRONCO BRACCIO-7
JIB SECTION-7

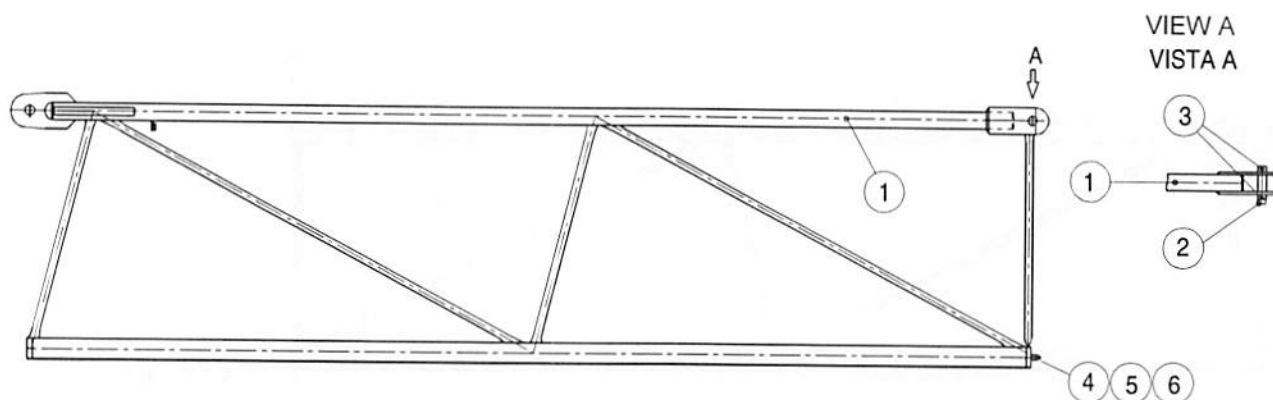


POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
314616070			TRONCO BRACCIO-7	JIB SECTION-7		
1	314616070	1	TRONCO BRACCIO 7	JIB SECTION-7		
2	380141111	1	SPINA CS 60 x 180	PIN		
3	883130012	2	COPIGLIA 10 x 90 Z - 4.8	SPLIT PIN		
4	880133143	2	VITE TE 20 x 80 Z - 8.8	SCREW		
5	881323006	2	DADO AUTOBLOCCANTE M20 N - CL.8	SELF LOCKING NUT		
6	881732009	2	ROND. PIANA M20 Z - 6.8	PLANE WASHER		

TRONCO BRACCIO-8
JIB SECTION-8

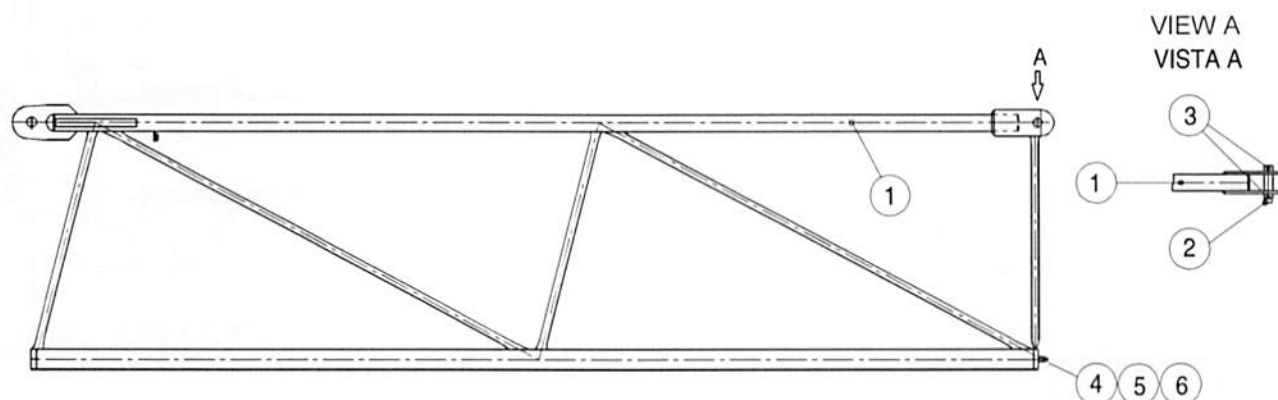


POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
314616080			TRONCO BRACCIO-8	JIB SECTION-8		
1	314616080	1	TRONCO BRACCIO-8	JIB SECTION-8		
2	380141112	1	SPINA CS 50 x 165	PIN		
3	883130013	2	COPIGLIA 10 x 70 Z - 4.8	SPLIT PIN		
4	880133143	2	VITE TE 20 x 80 Z - 8.8	SCREW		
5	881323006	2	DADO AUTOBLOCCANTE M20 N - CL.8	SELF LOCKING NUT		
6	881732009	2	ROND. PIANA M20 Z - 6.8	PLANE WASHER		

TRONCO BRACCIO-9
JIB SECTION-9


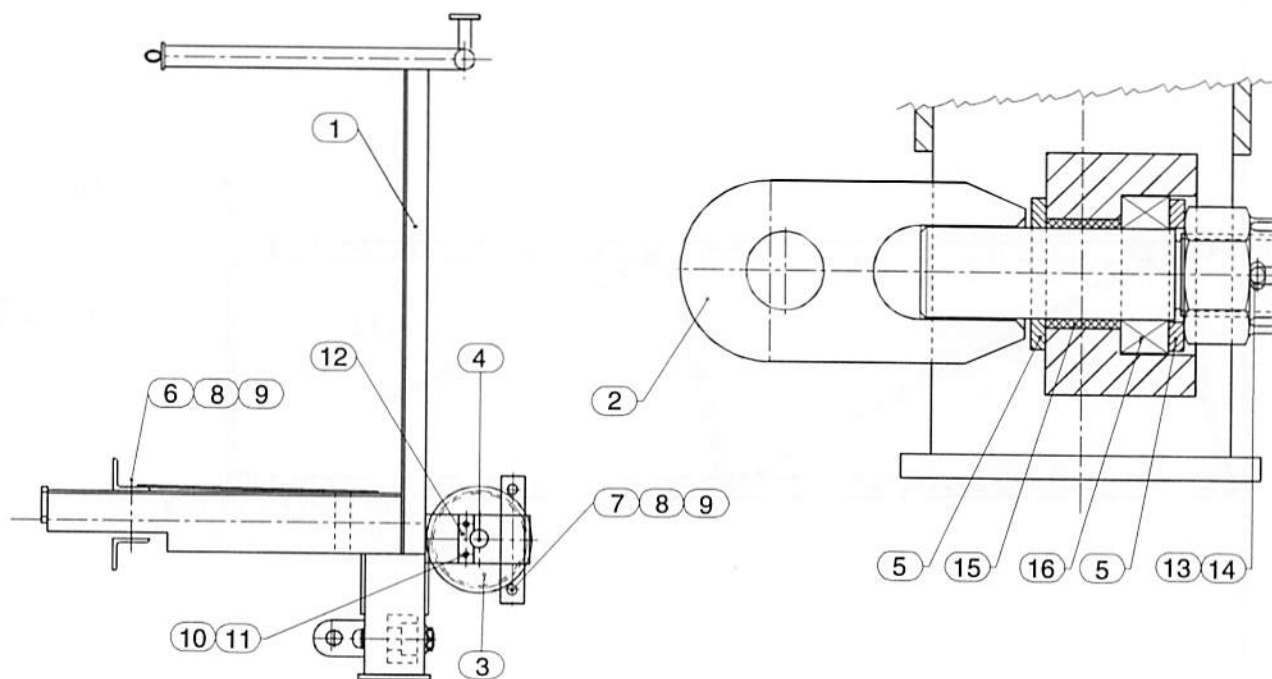
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
314616090			TRONCO BRACCIO-9	JIB SECTION-9		
1	314616090	1	TRONCO BRACCIO 9	JIB SECTION-9		
2	380141113	1	SPINA CS 45 x 140	PIN		
3	883130013	2	COPIGLIA 10 x 70 Z - 4.8	SPLIT PIN		
4	880133143	2	VITE TE 20 x 80 Z - 8.8	SCREW		
5	881323006	2	DADO AUTOBLOCCANTE M20 N - CL.8	SELF LOCKING NUT		
6	881732009	2	ROND. PIANA M20 Z - 6.8	PLANE WASHER		

TRONCO BRACCIO-10
JIB SECTION-10



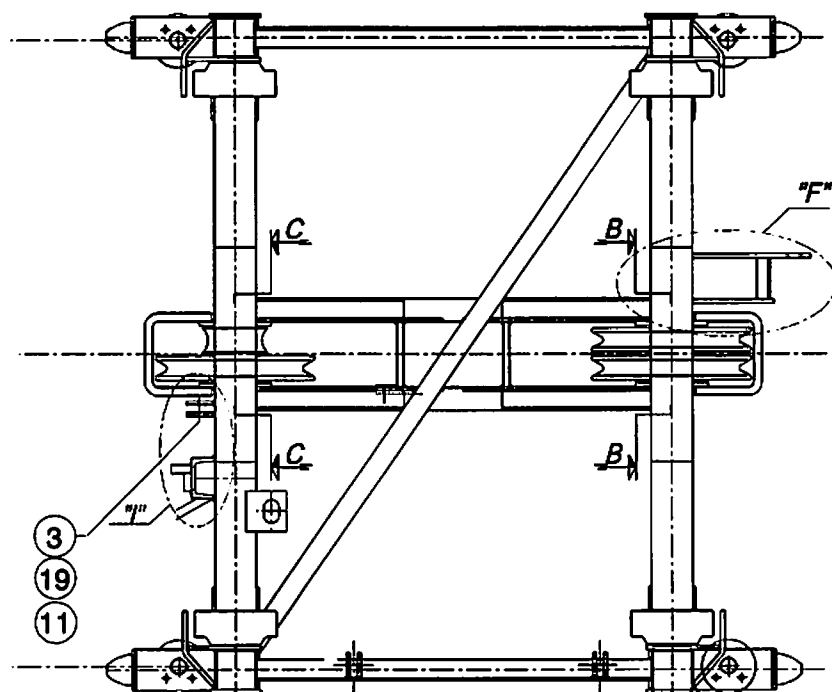
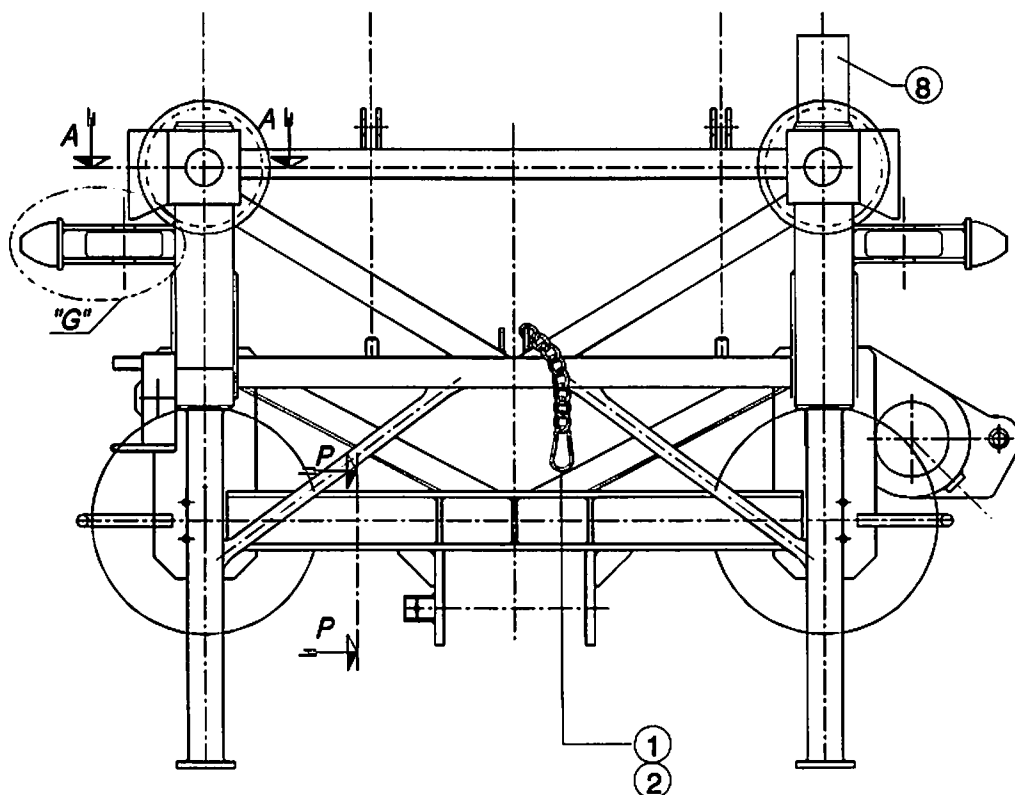
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
314616100			TRONCO BRACCIO-10	JIB SECTION-10		
1	314616100	1	TRONCO BRACCIO-10	JIB SECTION-10		
2	380141114	1	SPINA CS 35 x 115	PIN		
3	883130014	2	COPIGLIA 8 x 50 Z - 4.8	SPLIT PIN		
4	880133143	2	VITE TE 20 x 80 Z - 8.8	SCREW		
5	881323006	2	DADO AUTOBLOCCANTE M20 N - CL.8	SELF LOCKING NUT		
6	881732009	2	ROND. PIANA M20 Z - 6.8	PLANE WASHER		

**PUNTALE BRACCIO
JIB POINT SECTION**



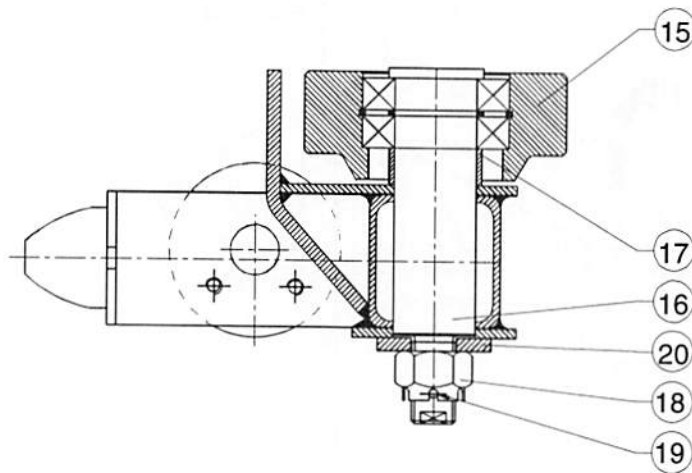
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
214916020			PUNTALE BRACCIO	JIB POINT SECTION		
1	214916020	1	PUNTALE BRACCIO	JIB POINT SECTION		
2	352100008	1	CAPOCORDA GIREVOLE	ROTATING CABLE TERMINAL		
3	350225001	1	PULEGGIA 7/8 F C176 34 26 R4,2	PULLEY		
4	380341014	1	SPINA PS 30 x 66	PIN		
5	382517004	2	DISTANZIALE Ø50 x 30,3 SP. 5	SPACER		
6	880133202	4	VITE TEIF M16 x 150 - 8.8	SCREW		
7	880133024	2	VITE TEPF M14 x 90 - 8.8	SCREW		
8	881023005	6	DADO M16	NUT		
9	881732007	4	RONDELLA M16	WASHER		
10	880133092	2	VITE TEIF M10 x 16 - 8.8	SCREW		
11	881732004	2	RONDELLA M10	WASHER		
12	383401001	1	PIASTRA FERMO SPINA 25 x 6	PIN LOCK PLATE		
13	881231002	1	DADO AD INTAGLI M27 - 8	NUT		
14	883130015	1	COPIGLIA 5 x 45	SPLIT PIN		
15	842401016	1	BOCCOLA Ø 30 x 36	BUSH		
16	840209003	1	CUSCINETTO	BEARING		

CARRELLO 6-8 t
6-8 t TROLLEY

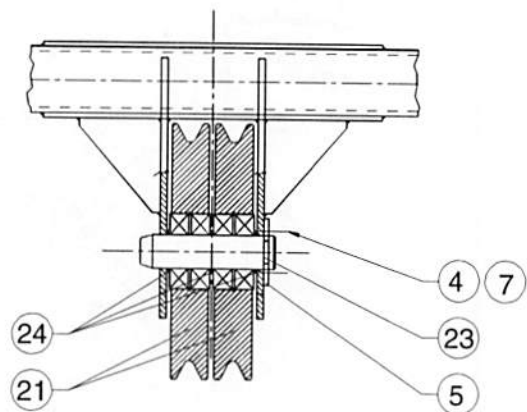


CARRELLO 6-8 t
6-8 t TROLLEY

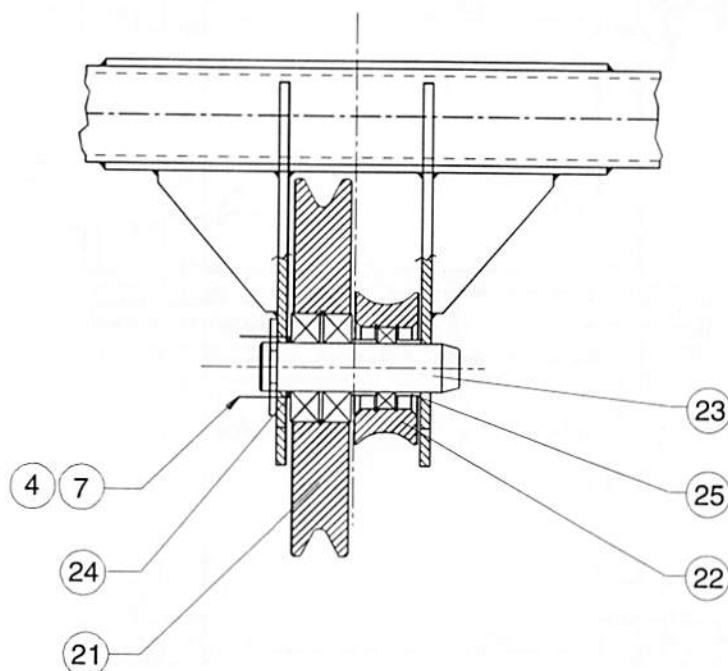
SECTION A-A
SEZIONE A-A
Scala 1:2.5



SECTION B-B
SEZIONE B-B
Scala 1:5

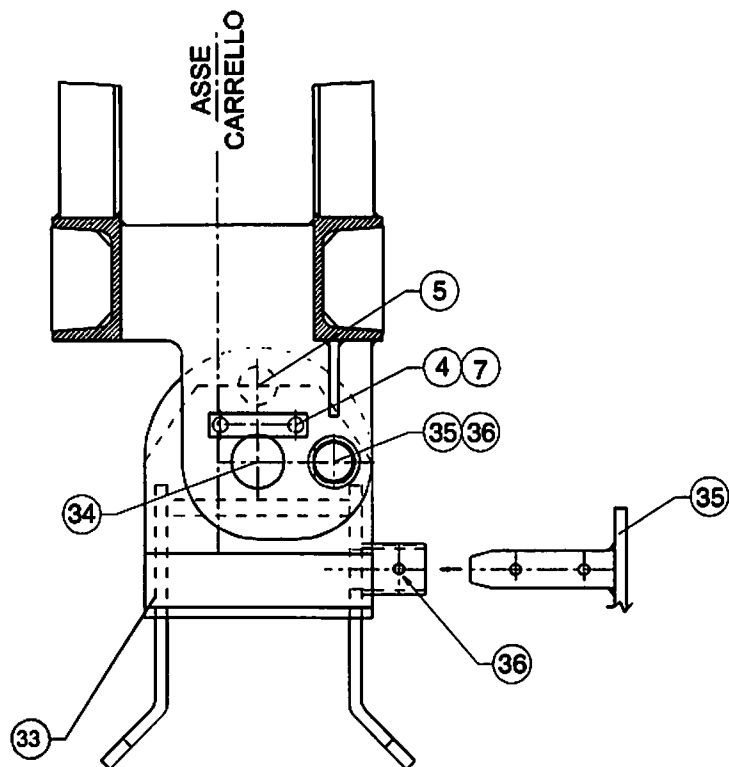


SECTION C-C
SEZIONE C-C
Scala 1:5

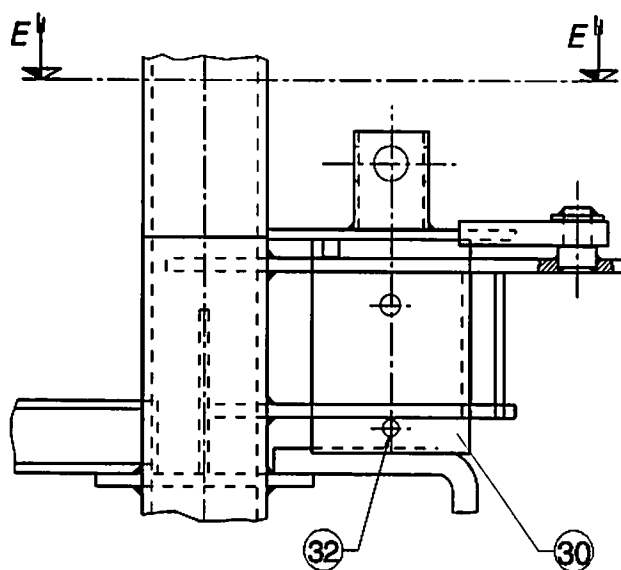


CARRELLO 6-8 t
6-8 t TROLLEY

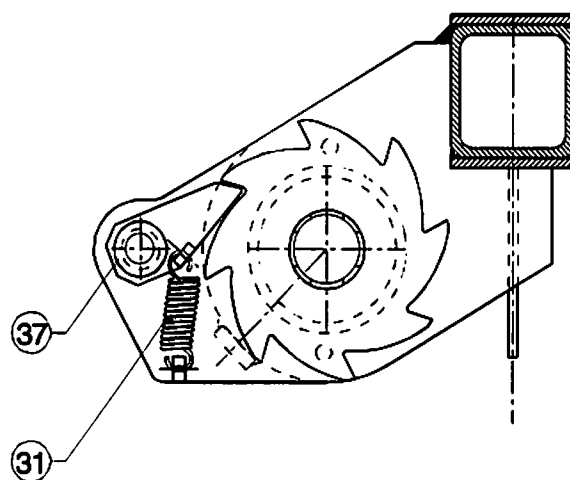
SEC. P-P
SEZIONE P-P
Scala 1:2.5



PARTICOLARE "F"
Scala 1:2.5
DETAIL "F"



SEZIONE E-E
Scala 1:2.5
SECTION E-E



CARRELLO 6-8 †
6-8 † TROLLEY

13

PARTICOLARE "G"

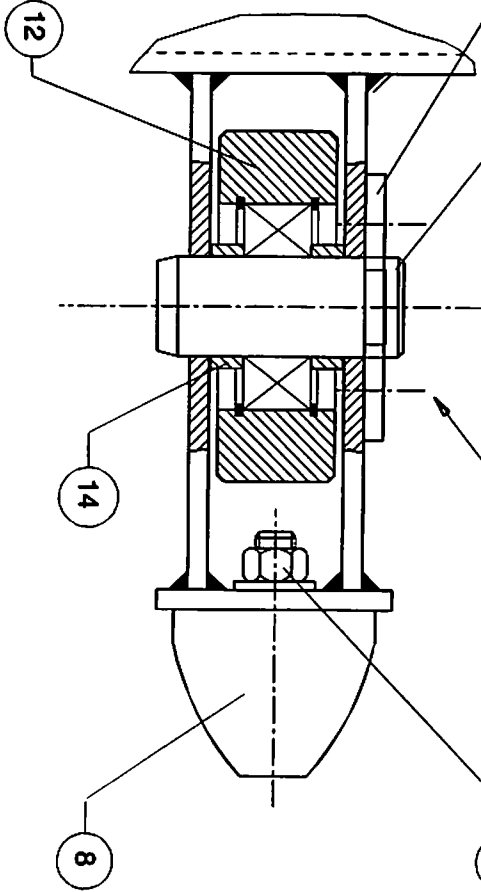
Scala 1:2,5

DETAIL "G"

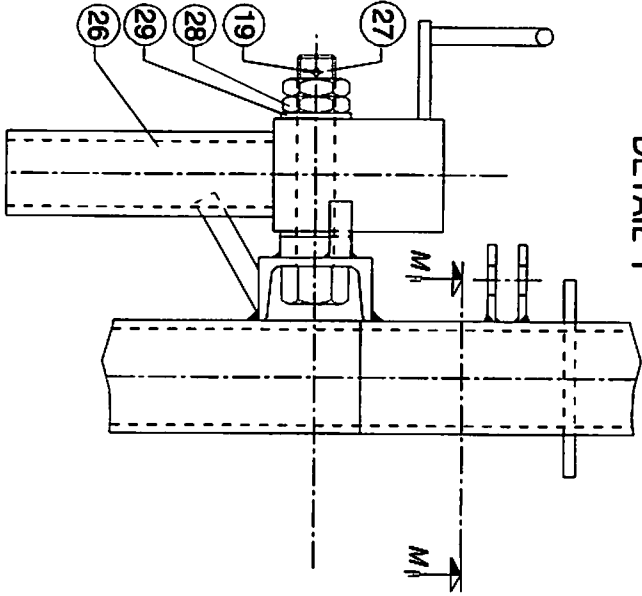
6 7

5

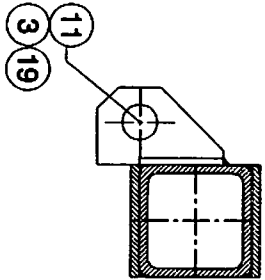
9 10



PARTICOLARE "I"
Scala 1:2,5
DETAIL "I"



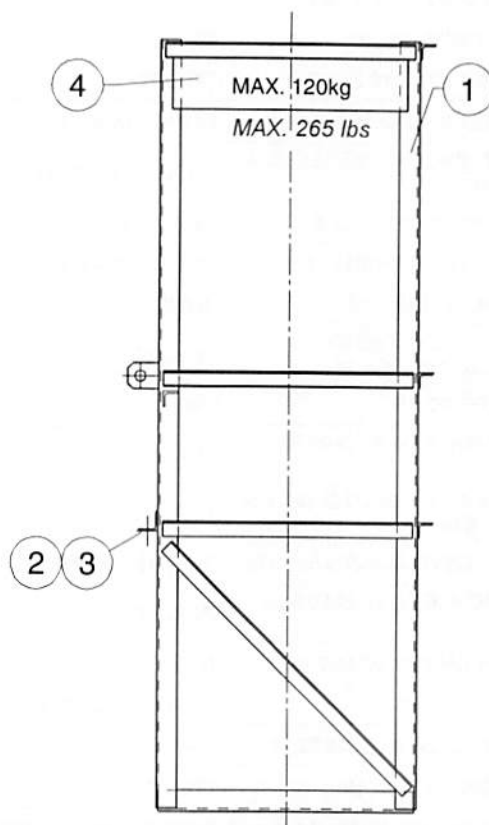
SEZIONE M-M
Scala 1:2,5
SECTION M-M





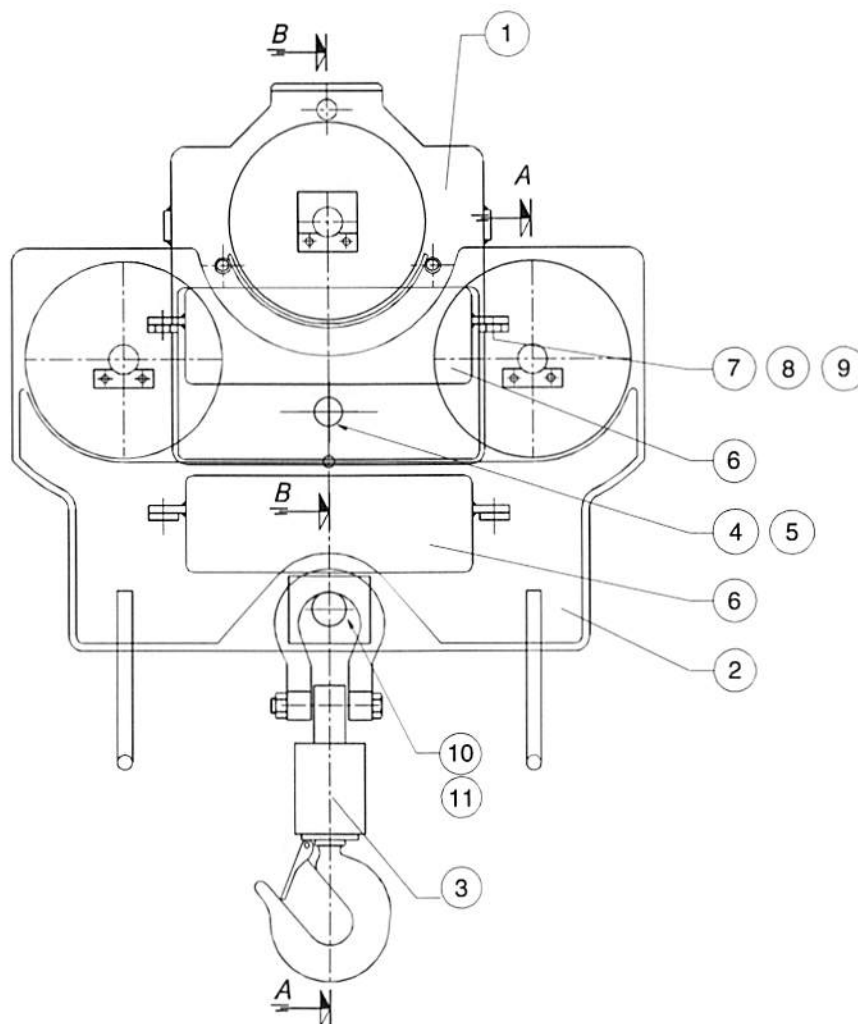
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
217701020			CARRELLO 6-8 t	6-8 t TROLLEY		
1	850902002	1	CATENA CON 9 ANELLI	CHAIN		
2	859900034	1	MOSCHETTONE 100 mm	SPRING CATCH		
3	380141115	1	SPINA CS 20 x 40	PIN		
4	880133093	6	VITE TEIF M10 x 20 Z - 8.8	SCREW		
5	383401001	7	FERMO SPINA 25 x 6	PIN LOCK		
6	880133092	8	VITE TEIF M10 x 16 Z - 8.8	SCREW		
7	881732004	14	RONDELLA PIANA M10 Z - 6.8	PLANE WASHER		
8	852502010	4	RESPINGENTE CARRELLO Ø 60 L=60 M12	TROLLEY BUFFER		
9	881023003	4	DADO MEDIO M12 - CL.8	MEAN NUT		
10	881732005	4	RONDELLA PIANA M12 - 6.8	PLANE WASHER		
11	883045002	1	REDANCIA FUNE Ø 8	THIMBLE		
12	852001021	4	RUZZOLA CONTRASTO CARRELLO Ø 105 x 35	ROLLER		
13	380341008	4	SPINA PS 30 x 61	PIN		
14	382606108	8	DISTANZIALE Øe 37 Øi 30,3 L= 9,75	SPACER		
15	852001020	4	RUZZOLA CARRELLO Ø 160 x 66 COMPLETA	ROLLER		
16	380741013	4	SPINA FILETTATA M27 x 50 x 156	THREADED PIN		
17	382606109	4	DISTANZIALE Øe 58 Øi 50,3 L= 22,5	SPACER		
18	881231002	4	DADO CON INTAGLI M27 x 2	NUT		
19	883130011	7	COPIGLIA 5 x 40	SPRING SPLIT PIN		
20	382506033	4	RONDELLA Øe 65 Øi 28 SP. 8	WASHER		
21	350200030	3	PULEGGIA Ø 310 x 46	PULLEY		
22	852001019	1	RUZZOLA GUIDA FUNE Ø 125 x 52	ROPE GUIDE ROLLER		
23	380341009	2	SPINA PS 40 x 151	PIN		
24	382606110	4	DISTANZIALE Øe 50 Øi 40,3 L= 4	SPACER		
25	382606111	2	DISTANZIALE Øe 46 Øi 40,3 L= 21	SPACER		
26	325001020	1	LEVA BLOCCAGGIO CARRELLO	TROLLEY STOP LEVER		
27	384233002	1	VITE TEPF M27 x 150 CON FORO Ø 5,5 Z - 8.8	SCREW		
28	881124007	2	DADO BASSO M27 Z - CL.10	FLAT NUT		
29	881732011	2	RONDELLA PIANA M27 Z - 6.8	PLANE WASHER		
30	318100030	1	TENDITORE FUNE CARRELLO	TROLLEY ROPE TENSIONING DEVICE		
31	885000018	1	MOLLA TRAZIONE A DUE OCCHI	SPRING		
32	883130006	1	COPIGLIA 10 x 120	SPRING SPLIT PIN		
33	318002010	1	SUPPORTO BOZZELLO	HOIST BLOCK SUPPORT		
34	380141103	1	SPINA CS 35 x 236	PIN		
35	380841009	2	SPINA S 25 x 95	PIN		
36	883200003	2	CHIAVISTELLO R D.6	SPRING SPLIT PIN		
37	881732008	1	RONDELLA PIANA M18 Z	PLANE WASHER		
38	880133096	1	VITE TEIF M10 x 35 Z PER TEND. FUNDE CARRELLO	SCREW		

BALLATOIO CARRELLO
JIB INSPECTION PLATFORM



POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
	320301311		BALLATOIO CARRELLO	JIB INSPECTION PLATFORM		
1	320301311	1	BALLATOIO CARRELLO	JIB INSPECTION PLATFORM		
2	380141101	2	SPINA C 20 x 40	PIN		
3	883130002	4	COPIGLIA 6 x 60	SPRING SPLIT PIN		
4	850100033	1	TABELLA PORTATA MASSIMA	MAX. LOADING CAPACITY TABLE		

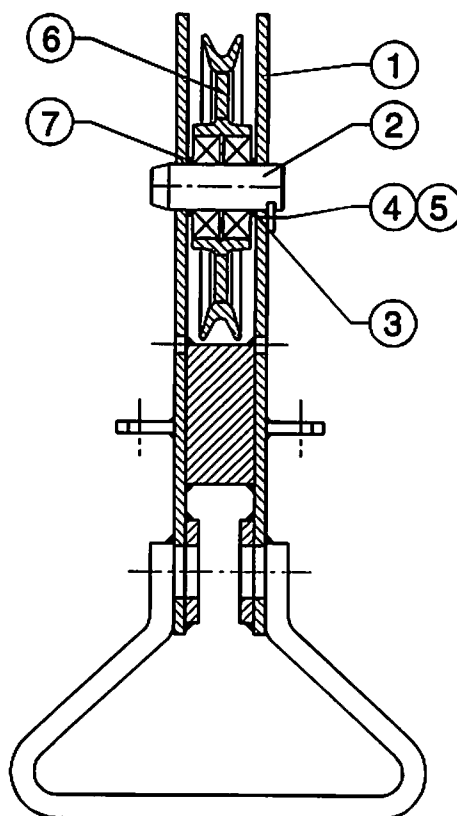
BOZZELLO DOPPIO 8t
DOUBLE HOIST BLOCK



POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
217808050			BOZZELLO DOPPIO 8t	DOUBLE HOIST BLOCK		
1	217808060	1	SEMIBOZZELLO TIRO IN IV	4-PART LINE AUX. HOIST BLOCK		
2	217804030	1	BOZZELLO TIRO IN II	2-PART LINE HOIST BLOCK		
3	362008020	1	PORTAGANCIO 8 t (TL)	HOOK HOLDING BLOCK		
4	380641004	1	SPINA M 35 x 245	PIN		
5	883200003	1	COPIGLIA R6	SPRING SPLIT PIN		
6	390901050	4	ZAVORRA 20 kg TIPO "A"	BALLAST PLATE		
7	384233001	8	VITE TEIF M14 x 45 (CON FORO Ø 4) Z - 8.8	SCREW		
8	881023004	8	DADO MEDIO M14 - 8	MEAN NUT		
9	883130001	8	COPIGLIA 4 x 40	SPRING SPLIT PIN		
10	380243039	1	SPINA T 45 x 90	PIN		
11	883130004	1	COPIGLIA 8 x 70	SPRING SPLIT PIN		

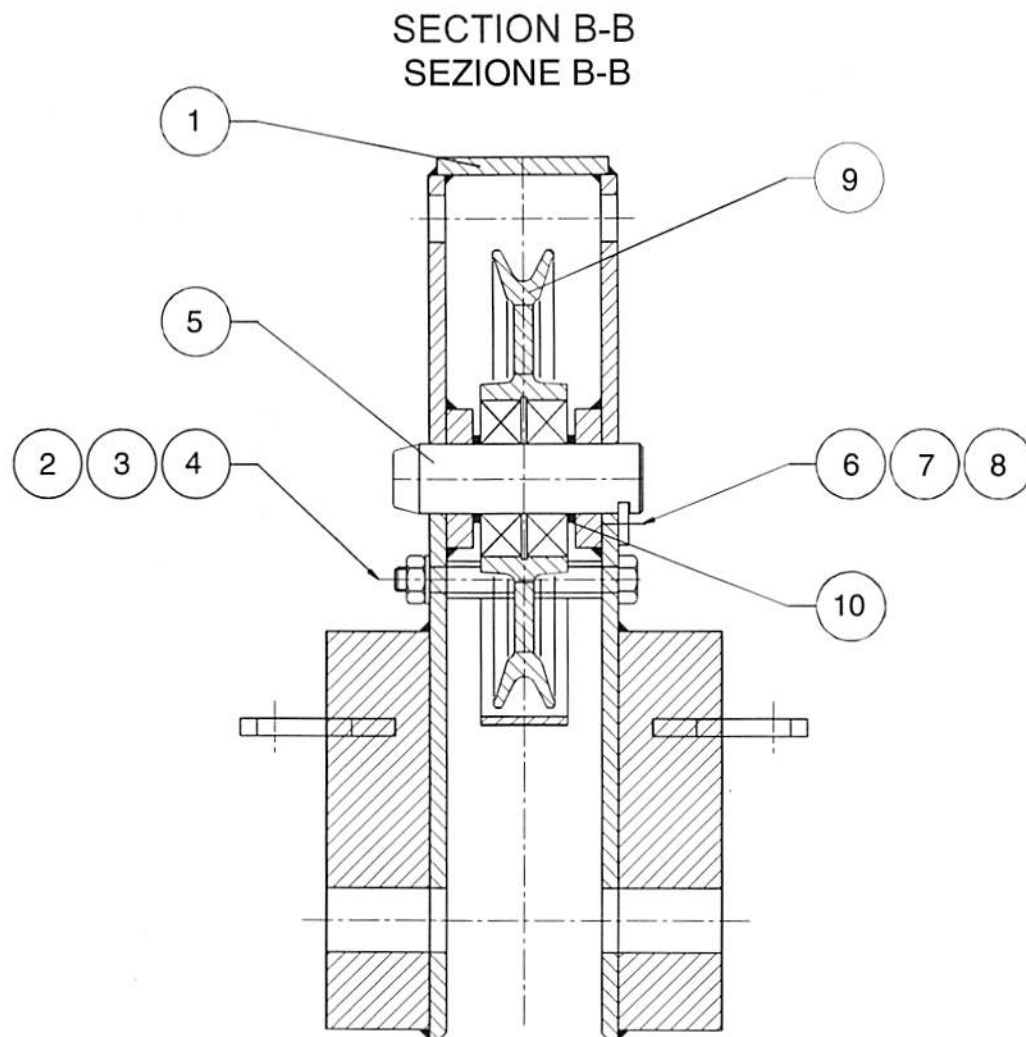
**BOZZELLO TIRO IN II (3-4 t)
HOIST BLOCK**

**SECTION A-A
SEZIONE A-A**



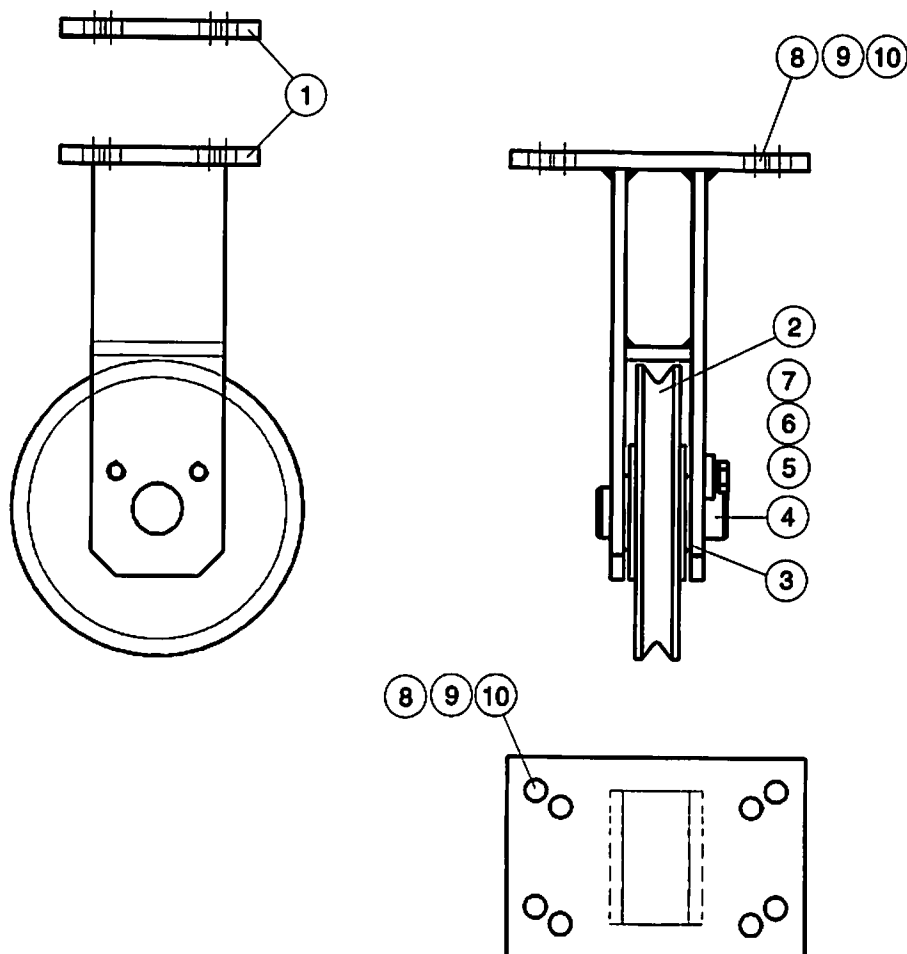
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
217804030 BOZZELLO TIRO IN II (3-4t) HOIST BLOCK						
1	217804030	1	BOZZELLO TIRO IN II (3 - 4 t)	2-PART LINE HOIST BLOCK		
2	380341011	2	SPINA PS 40 x 101	PIN		
3	383401001	2	FERMO SPINA 25 x 6	PIN LOCK		
4	880133093	4	VITE TEIF M10 x 20 Z - 8.8	SCREW		
5	881732004	4	RONDELLA M10 - 6.8	WASHER		
6	350224001	2	PULEGGIA 264 49 35 R 6,5	PULLEY		
7	382606113	4	DISTANZIALE Øe 50 Øi 40,3 SP. 5	SPACER		

SEMIBOZZELLO TIRO IN IV (6-8 t)
AUXILIARY HOIST BLOCK



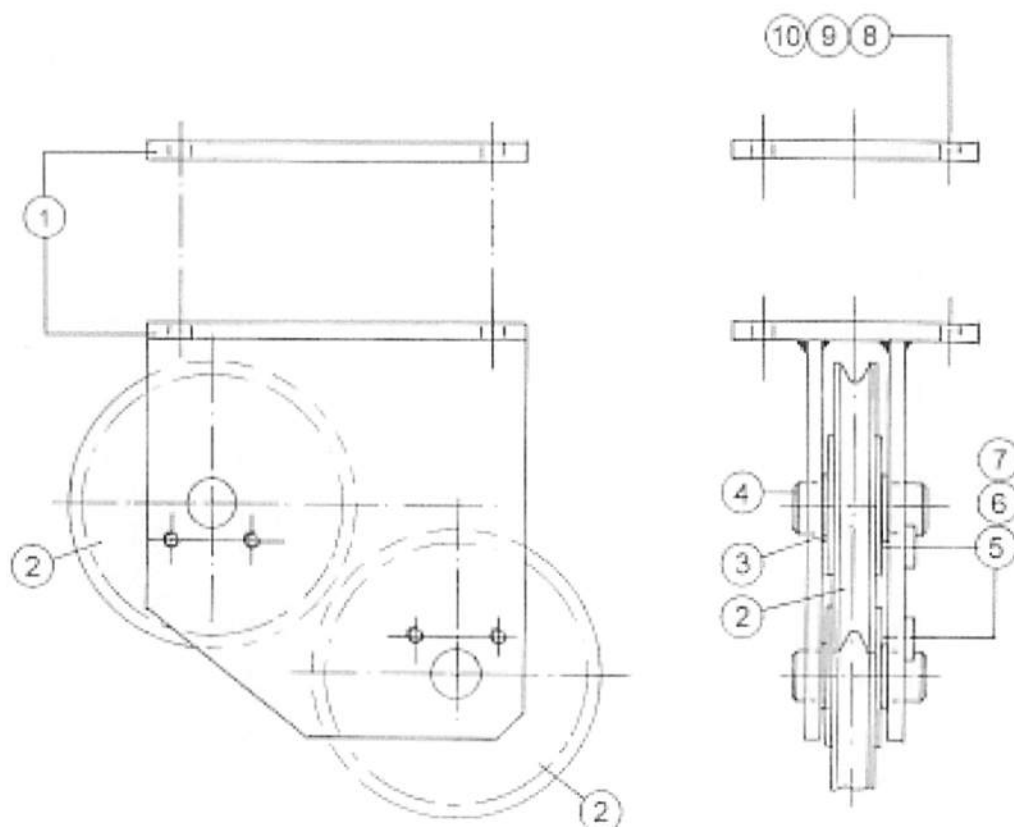
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
217808060			SEMIBOZZELLO TIRO IN IV (6-8t)	4-PART LINE AUX. HOIST BLOCK		
1	217808060	1	SEMIBOZZELLO TIRO IN IV (6 - 8 t)	4-PART LINE AUX. HOIST BLOCK		
2	880133027	2	VITE TEPF M14 x 130 - 8.8	SCREW		
3	881023004	2	DADO MEDIO M14 - 8	MEAN NUT		
4	881732006	2	RONDELLA M14 - 6.8	WASHER		
5	380341010	1	SPINA PS 40 x 131	PIN		
6	383401001	1	FERMO SPINA 25 x 6	PIN LOCK		
7	880133093	2	VITE TEIF M10 x 20 - 8.8	SCREW		
8	881732004	2	RONDELLA M10 - 6.8	WASHER		
9	350224001	1	PULEGGIA 264 49 35 R 6,5	PULLEY		
10	382606113	2	DISTANZIALE Øe 50 Øi 40,3 SP. 5	SPACER		

SUPPORTO "A" FUNE CARRELLO
SUPPORT "A" FOR TROLLEY ROPE



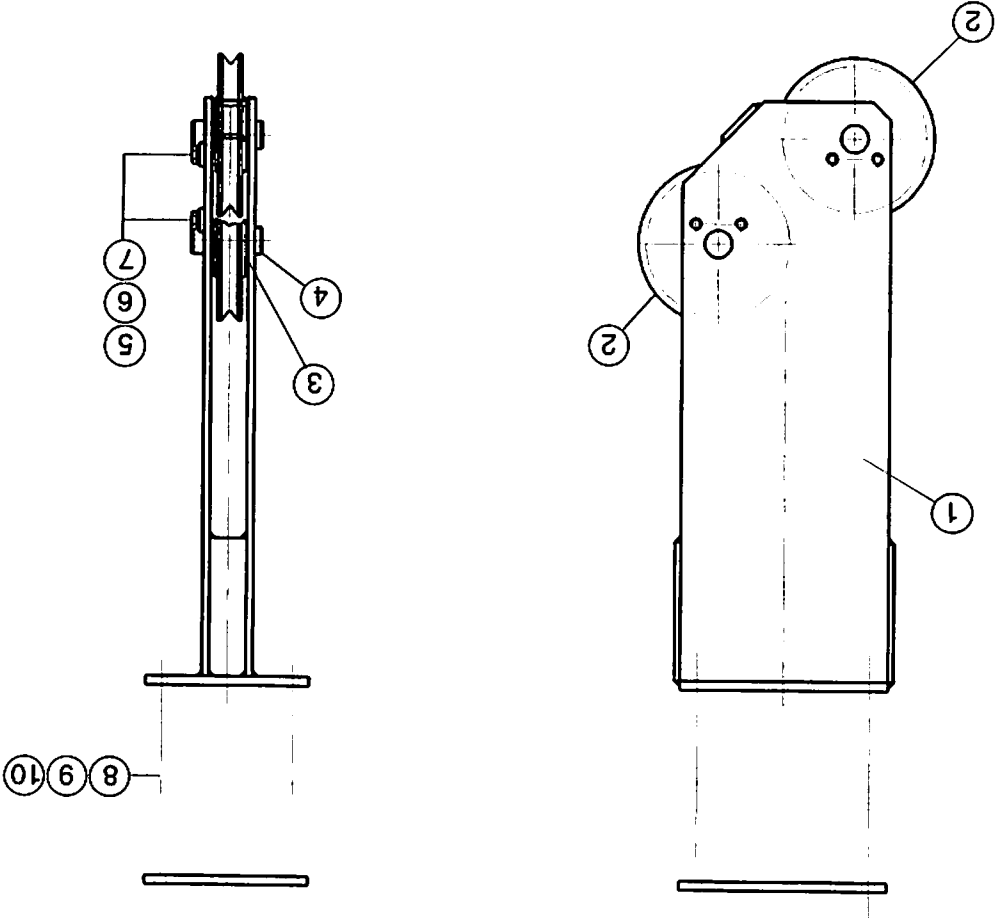
POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
226400035-1			SUPPORTO "A" FUNE CARRELLO	SUPPORT "A" FOR TROLLEY ROPE		
1	226400035	1	SUPPORTO "A" FUNE CARRELLO	SUPPORT "A" FOR TROLLEY ROPE		
2	350225001	1	PULEGGIA C176 34 26 R 4,2	PULLEY		
3	382517007	2	DISTANZIALE Ø 40 x 30,3 SP. 2,5	SPACER		
4	380341014	1	SPINA PS 30 x 66	PIN		
5	880133092	2	VITE TEIF M10 x 16 Z - 8.8	SCREW		
6	881732004	2	RONDELLA M10 Z - 6.8	WASHER		
7	383401001	1	FERMO SPINA 25 x 6	PIN LOCK		
8	880133109	4	VITE TEIF M12 x 150 Z - 8.8	SCREW		
9	881732005	4	RONDELLA M12 Z - 6.8	WASHER		
10	881323003	4	DADO AUTOBLOCCANTE M12 Z - 8	SELF LOCKING NUT		

SUPPORTO "B" FUNE CARRELLO
SUPPORT "B" FOR TROLLEY ROPE



POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
226400036			SUPPORTO "B" FUNE CARRELLO	SUPPORT "B" FOR TROLLEY ROPE		
1	226400036	1	SUPPORTO "B" FUNE CARRELLO	SUPPORT "B" FOR TROLLEY ROPE		
2	350225001	2	PULEGGIA C176 34 26 R 4,2	PULLEY		
3	382517007	4	DISTANZIALE Ø 40 x 30,3 SP. 2,5	SPACER		
4	380341014	2	SPINA PS 30 x 66	PIN		
5	880133092	4	VITE TEIF M10 x 16 Z - 8.8	SCREW		
6	881732004	4	RONDELLA M10 Z - 6.8	WASHER		
7	383401001	2	FERMO SPINA 25 x 6	PIN LOCK		
8	880133109	4	VITE TEIF M12 x 150 Z - 8.8	SCREW		
9	881732005	4	RONDELLA M12 Z - 6.8	WASHER		
10	881323003	4	DADO AUTOBLOCCANTE M12 Z - 8	SELF LOCKING NUT		

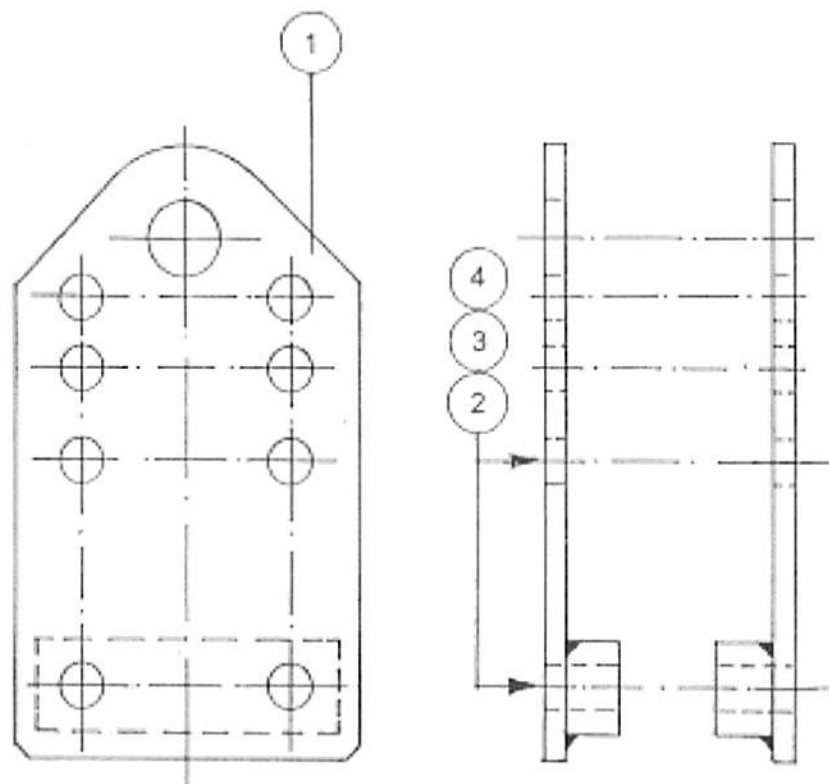
SUPPORTO "C" FUNE CARRELLLO
SUPPORT "C" FOR TROLLEY ROPE



POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
------	--------	-------	-------------	-------------	-------------	-------------

1	326400100	1	SUPPORTO "C" FUNE CARRELLLO	SUPPORT "C" FOR TROLLEY ROPE		
2	350225001	2	PULEGGA C176 34 26 R 4,2	PULLEY		
3	382517007	4	DISTANZALE Ø 40 x 30,3 SP. 2,5	SPACER		
4	380341014	2	SPINA PS 30 x 66	PIN		
5	880133092	4	VITE TEIF M10 x 16 Z - 8.8	SCREW		
6	881732004	4	RONDELLA PIANA M10 Z - 6.8	WASHER		
7	383401001	2	FERMO SPINA 25 x 6	PIN LOCK		
8	880900053	4	BARRA FILETTATA M12x200	THREADED BAR		
9	881732005	8	RONDELLA PIANA M12 Z - 6.8	WASHER		
10	881323003	8	DADO AUTOBLOCCANTE M12 Z - 8	SELF LOCKING NUT		

**GOLFARE MONTAGGIO BRACCIO
EYEBOLT FOR JIB ASSEMBLY**



POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
225100080			GOLFARE MONTAGGIO BRACCIO	EYEBOLT FOR JIB ASSEMBLY		
1	225100080	1	GOLFARE MONTAGGIO BRACCIO	EYEBOLT FOR JIB ASSEMBLY		
2	880900050	4	BARRA FILETTATA M16 Z	THREADED BAR		
3	881732007	8	RONDELLA M16 Z	WASHER		
4	881224015	8	DADO ALTO M16	TALL NUT		

SUPPORTO TABELLA DI PORTATA
LOAD RATING CHART SUPPORT



POS.	CODICE	Q.TA'	DESCRIZIONE	DESCRIPTION	DESIGNATION	BEZEICHNUNG
	326400045		SUPPORTO TABELLA DI PORTATA	LOAD RATING CHART SUPPORT		
1	326400045	1	SUPPORTO TABELLA DI PORTATA	LOAD RATING CHART SUPPORT		

2 MAINTENANCE

2.1 GENERAL

Maintenance of the slewing upper part is an on going process divided in two main phases: inspection and repair.

Inspection consists of all the appropriate operations required to locate, identify and assess problems which might weaken the safety and functionality of the unit.

Repair is directly related to the inspection carried out and, resolving each detected deficiency, restores the unit to its original configuration and state of operation.



For detailed information on the maintenance programme recommended by the manufacturer, refer to **Chapter 8 “General Maintenance”** of the crane operation manual.

2.2 GROUPS SUBJECT TO MAINTENANCE

To facilitate the routine maintenance operations, the systems/components have been shared into main groups of intervention.



For detailed information, refer to **Chapter 8 “General Maintenance”** of the crane operation manual.

Details of the slewing upper part subject to maintenance:

- 1) *Structures (slewing ring support, cab section, counterjib, jib and ties).*
- 2) *Ropes, hoist blocks, hooks and sheaves.*
- 3) *Electrical components.*

2.3 ROUTINE MAINTENANCE AND PERIODICAL INSPECTIONS

Maintenance procedures consist of two phases:

INSPECTION

REPAIR

This system guarantees that all potential deficiencies of the unit are identified and repaired.

Defects which cannot be solved during this phase will become part of the 'SPECIAL MAINTENANCE'.



For detailed information on the criterion to be used when carrying out routine maintenance, refer to **Chapter 8 “General Maintenance”** of the crane operation manual.

2.3.1 Daily inspections

- A) The operator, a qualified and trained person, is responsible for monitoring the crane. The daily inspection of the slewing unit gives an assessment of the general conditions of the crane and the possibility to find possible problems regarding structural, mechanical, electrical or accessory parts (such as ropes and hooks).

Anyhow, a general inspection of the slewing unit prior to placing the crane in service is recommended. This also applies for cranes with ground control (radio control or remote control).

- B) Check for proper connections of ladders, platforms, safety rails, general protections (protective covers) and special devices provided for the operator's safety.

2.3.2 Weekly inspections

- A) Make sure that all structural pin-connections are placed in the special housings and secured with the relative split pins.
- B) Make sure that all structural pin-connections are placed in the special housings and secured with the relative nuts and properly tensioned, for the torque wrench setting, refer to the following table:

JIB SECTION CONNECTION	CLASS 8.8 SCREW	CLASS 8 SELF-LOCKING NUT	CLASS 6.8 WASHER	TORQUE WRENCH SETTING	
				[Nm]	[ft.lbs]
22-23	M20 x 80	M20	M20	440	325
23-24	M20 x 80	M20	M20	440	325
24-25	M20 x 80	M20	M20	440	325
25-5	M20 x 80	M20	M20	440	325
5-6	M20 x 80	M20	M20	440	325
6-7	M20 x 80	M20	M20	440	325
7-8	M20 x 80	M20	M20	440	325
8-9	M20 x 80	M20	M20	440	325
9-10	M20 x 80	M20	M20	440	325
10 - Jib point	M20 x 80	M20	M20	440	325

- C) Inspect the control cab for any evidence of water leakage; if so, ventilate until it is completely dry.
- D) Inspect all safety and protection devices.
- E) Grease the snub pulley as specified in the lubrication chart (para. 2.5).
- F) Visually inspect the integrity of the electrical and electronical components.

2.3.3 Monthly inspections

- A) With great accuracy visually examine all the weldings of the cab section and of the slewing ring support checking for visible cracks.
Examine closely welds that are rusted: rust is often a sign of crack in a structural weld.
- B) Grease all pin-connections as specified in the lubrication chart (para. 2.5).
- C) Inspect the sheaves and their respective bearings, replacing any damaged components.
- D) Inspect the ropes for stretching and deformation as indicated in para. 2.6.1.4. Replace any defective rope.
Grease the hoisting and trolley traversing ropes as specified in the lubrication chart (para. 2.5).
Check for the trolley traversing rope proper tension. Adjust it, as necessary, by the rope tensioner placed on the trolley.
Make sure that the swivel socket on jib tip for the hoist rope is properly greased. If needed, add some lubricant through the lubricator placed on the support block (if provided), which is welded to the structure.
- E) Open the electrical boxes on the control cab and on the counterjib and visually inspect the relays, fuses, connections and other electric devices for signs of water leakage, short circuit, burning or other damages. Check that the components are properly installed. Then close the electrical panel.

2.3.4 Quarterly inspections

- A) With great accuracy visually examine all the welding of the jib, the counterjib, the trolleys and hoist blocks checking for visible cracks.
Examine closely welds that are rusted: rust is often a sign of crack in a structural weld.
- B) Using low pressure compressed air remove the dust from inside the electrical boxes and panels.

2.3.5 Six-monthly inspections

- A) With great accuracy visually examine all the welding of the ladders, the platforms and safety rails.
- B) Check the conditions of all the crane connecting systems: any corroded, worn out or damaged pins, split pins, screws and nuts shall be replaced by Comedil technicians.
- C) Inspect all sheaves and bearings for evident signs of wear.
- D) Inspect the brushes of the windshield wipers in the cab for evident signs of wear and replace them as necessary.

2.3.6 Annual inspections

- A) Visually inspect the jib pins for evident signs of wear generated by the stresses they are subjected to.
Defective pins shall be replaced by Comedil technicians.
- B) Perform non-destructive tests on structural welds located on the cab sections on the jib, on the slewing ring support and on the counterjib.
- C) Treat corrosion on and repaint all oxidized parts of the crane.
- D) Perform non-destructive test on the hoist block and tie-bar welds.
- E) Calibration of the electronic system shall be carried out by Comedil technicians (special maintenance).

Important advice:

*Should extraordinary events happen, such as long periods of driving rain with lightening striking near the crane, protracted work in a corroding ambient or in particularly foul areas, etc. **MORE FREQUENTLY AND CAREFULLY INSPECT** the electrical equipment for evident signs of wear. In particular, check for any possible leakages of water into the electrical boxes.*

2.4 SPECIAL MAINTENANCE

Special maintenance tasks shall be carried out by skilled technicians who have been properly trained and have the experience to accomplish these tasks.

Specialists only shall be appointed to carry out the following operations:

- A) Crane erection or dismantling;
- B) Replacement of hoist and trolley traversing ropes;
- C) Calibration of rated capacity limiters and limit switches;
- D) Repair of electronic components and calibration of electronic systems which operate the crane movements and mechanisms;
- E) Repair of the electrical equipment;
- F) Non-destructive testing for structural damage; repairs and replacement of the crane structural parts.

2.5 LUBRICATION AND OILS

PARTS TO BE SERVICED	LUBRICANT
SHEAVES	SHIELD FLUID 3K
ROPES	BRILUBE 50
PINS	SHIELD FLUID 3K

2.6 ROPES

All ropes installed on the crane must be in good condition and the individual wires must not be broken, corroded or show signs of wear in order to ensure the maximum degree of safety during operations.

Inspect the ropes carefully and daily.

Particular attention shall be given to the condition of wire ropes near the sockets placed on the structure and on the trolley.

A complete rope inspection shall be performed any time a crane accident occurs or when taking the crane back into operation after a long time of inactivity.

The ropes shall be kept clean from sand and cement deposits and shall be lubricated at regular intervals.

Besides the ropes, inspect all the components they pass through and the structural surfaces they are in contact with, such as:

- Sheaves (see para. 2.7);
- Winch drums: check the proper spooling of the rope on them.
- Rope protections and guides.
- Pins and structural parts that make contact with ropes.

**Important advice**

When the crane is supplied with 4-Part Line but mainly works with 2-Part Line, at least once a week use it with the 4-Part Line engaged. Uncoil the rope from the drum completely, thus relieving any internal tension arisen. Then coil it again with a light weight hanging from the hook (this keeps the rope taut). Always check for proper and uniform coiling of the rope on the drum.

If the final height of the crane is quite considerable, you should provide for two rope coils with different length: one to be used for heights less than or equal to the maximum freestanding height of the crane, the other for heights exceeding it.

2.6.1 Instructions for the installation of the ropes

2.6.1.1 Spooling off new ropes

Ropes are packaged by the manufacturer by spooling them on a coil or wooden spool or by simply rolling them up, depending on their own length and diameter.

Should a new rope be rolled up, spool it off by placing it first on a spinning reel and then pulling the rope end in a straight line, thus allowing it to spin around the axis of the reel (picture 2.6.1).

Should a new rope be spooled on a coil, insert a metal bar of proper length and diameter through its holes and lay its ends onto two "Y" support stands.

Pull the rope end in a straight line and do not allow it to slacken as it is spooled off (picture 2.6.2).

Picture 2.6.1



Picture 2.6.2



2.6.1.2 Rope loading break-in-period



A break in period must be allowed for new ropes installed on the crane. This means that the maximum allowable loads cannot be placed upon the new rope for a short period of time.

This break in period allows the rope to slowly adapt to normal working conditions

Failing to observe this break in period could lead to excessive work of the rope, thus causing possible premature breakages and reducing the work life of the rope itself.

26.1.3 *Rope replacement*

No precise rules can be given for determining the exact time when the rope has to be replaced, since many variable factors are involved. Once a rope reaches any one of the specified removal criteria, it may be allowed to operate to the end of the work shift, based on the judgement of a qualified person.

The rope shall be replaced after that work shift, at the end of the day, or at the latest prior to the equipment being used by the next work shift.

Removal criteria for rope replacement shall be as follows:

- A) evidence of any of the defects outlined in pictures 2.6.3, 2.6.4, 2.6.5, 2.6.6;
- B) wear of 6% the original diameter, even in a single point;
- C) one or more wires are broken. Count the outer wires broken on the rope section worn most seriously. Maximum 5 or 10 broken wires are acceptable in a rope section 6 and 30 times its diameter respectively. Count the outer wires broken on both rope sections and replace the rope in case the number of broken wires exceeds the safety limit even in only one of them. Broken wires are wires showing a wear of 50% the original diameter upon visual inspection.
- D) 1 strand broken or reduction from nominal diameter greater than 40%;
- E) the rope is buckled, chinked or permanently twisted due to hitting or rubbing on sharp edges;
- F) the core of the rope protrudes through the rope itself even in a single point;
- G) one or more strands are not taut or project out of the rope, when this is under tension.

Broken wire removal criteria cited hereon apply to wire rope operating on steel sheaves and drums.

The user shall contact Comedil Engineering Department for broken wire removal criteria for wire ropes operating on sheaves and drums made of material other than steel.

Individual wire breakings are difficult to detect because the broken wire end usually remains in its original position and does not protrude from the strand.

To check for broken wires in a suspected area, remove the lubricant from the rope section and rub the strands with a piece of soft wood. Also bend the rope by hand, thus allowing broken wires to protrude from the strand and become visible to the eye.

Replacement rope and sockets shall have a strength rating at least as great as the original rope and sockets furnished by the Manufacturer.

Any deviation from the original size, grade or construction shall be specified by Comedil.

Prior to any rope replacement, visually inspect the sheave and drum rope guides for evident signs of wear or deformation due to reeving of the old rope. Make sure that sheaves can rotate freely without considerable slacks; otherwise replace bearings or bushes.

With wire rope operating on drum through several layers, attention to the waps of the first layer and to their proper fitting without crossings, resulting in a correct tension of the rope during the spooling process and in a correct operation of the crane.

2.6.14 Common rope defects

Rope common defects requiring immediate rope replacement and their causes are depicted in the following pictures:



Picture 2.6.3

Loop formations

Wires or groups of wires form a line of loops parallel to the axis of the rope.

This deformation is often caused by shock loading.

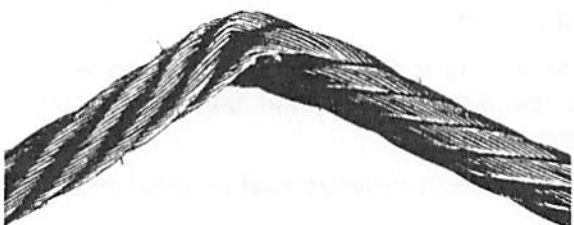


Picture 2.6.4

Nodes

A node is a local increase in rope diameter with the core easily visible among several covering strands. It can be caused by shock loading.

Corrosion and signs of wear are often noted on the outer wires.



Picture 2.6.5

Flat areas

A flattening can be caused by bending the rope severely over the rim of a sheave or any sharp object with the wires on the inside of the bend being forced out of position.



Picture 2.6.6

Birdcage (Basket Deformation)

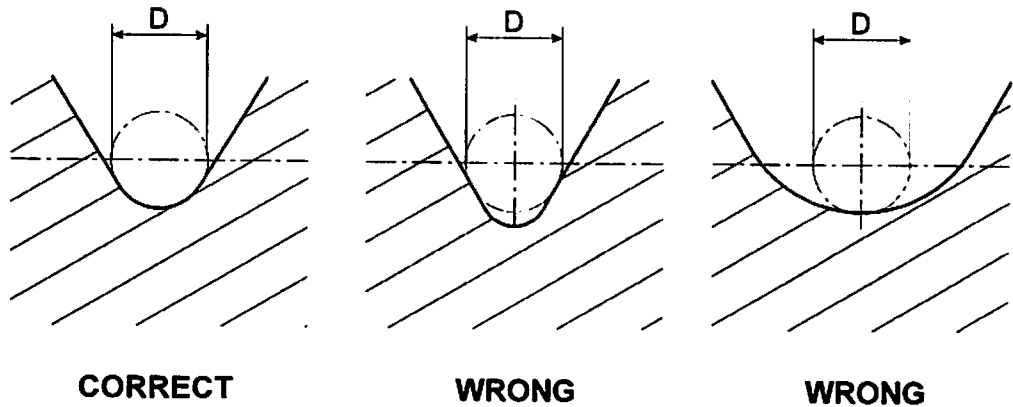
A birdcage develops when the outer layer of strands becomes longer than the inner layer of strands. The condition may occur as a result of incorrect fitting, tight sheaves, shock loading, incorrect use of a swivel or the application of a heavy load to a new rope before the strands have settled into position.

2.7 SHEAVES



Before installing a new rope inspect all sheave and drum races for evident signs of wear and deformation due to reeving of the old rope.

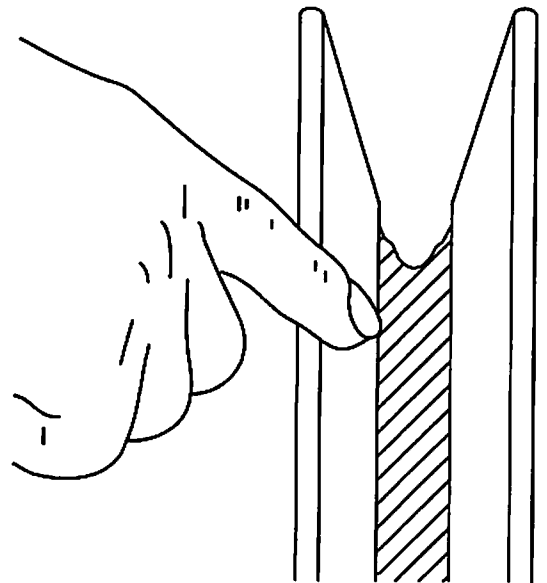
Picture 2.7.1



If defective races are discovered, take corrective action to restore the original condition by grinding their profiles.

It is very important that the sheave wheels turn freely without excessive clearances. Replace any defective bearings and bushes as necessary.

Lastly, check that there are no rope wear marks or grooves on the sheave.



Picture 2.7.2