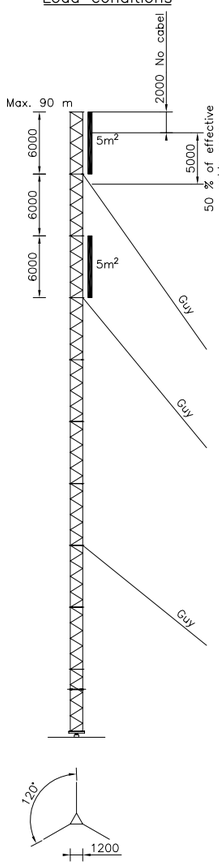
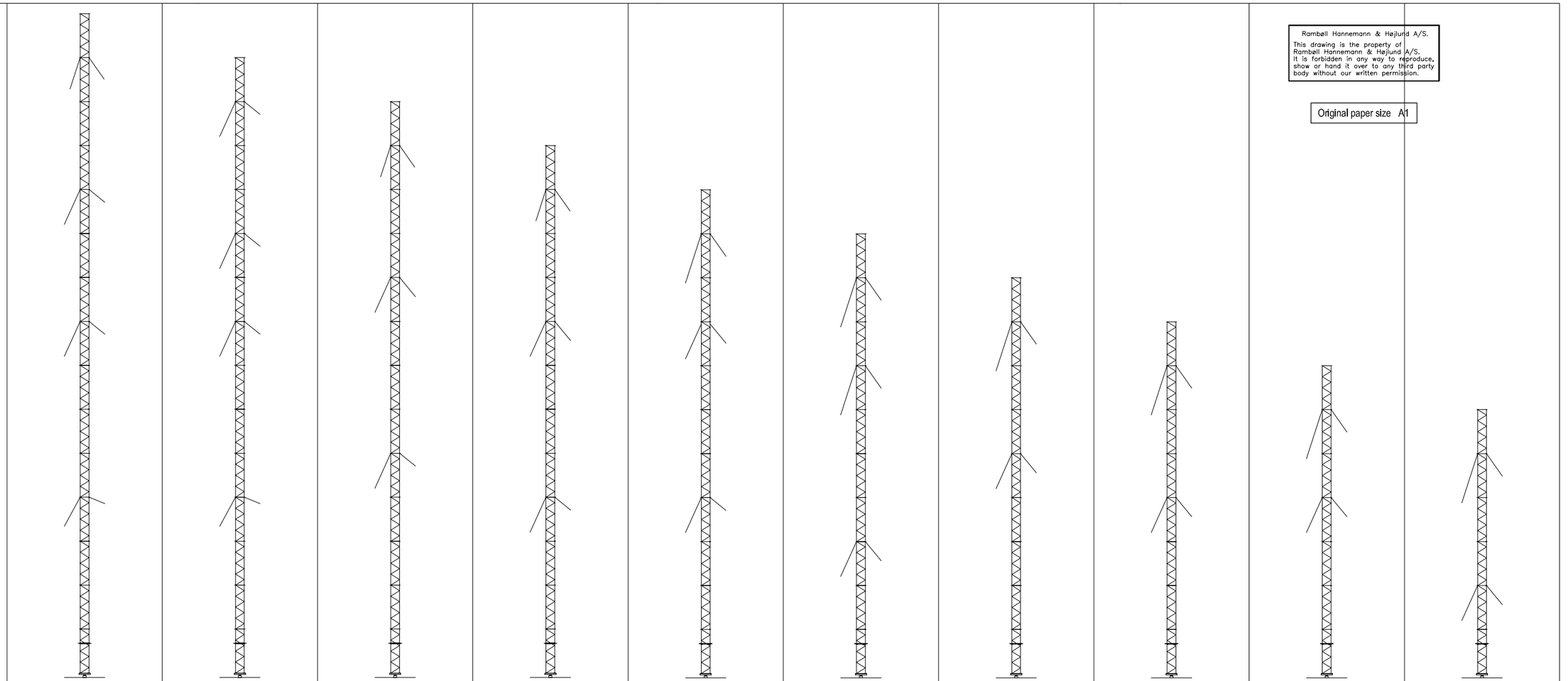
Load conditions





Mast type. (Rambøll drawing)	90 m Normal 5m²+5m²	84 m Normal 5m²+5m²	78 m Normal 5m²+5m²	72 m Normal 5m²+5m²	66 m Normal 5m²+5m²	60 m Normal 5m²+5m²	54 m Normal 5m²+5m²	48 m Normal 5m²+5m²	42 m Normal 5m²+5m²	36 m Normal 5m²+5m²
Drawing: (Rambøll drawing)	M139	M138	M137	M136	M135	M134	M133	M132	M131	M130
Foundation, Soil: (Rambøll drawing)	FM1008	FM1008	FM1008	FM1008	FM1008	FM1008	FM1008	FM1008	FM1008	FM1008
Foundation, Rock: (Rambøll drawing)	FM1007	FM1007	FM1007	FM1007	FM1007	FM1007	FM1007	FM1007	FM1007	FM1007
Foundation, Soil: (Rambøll drawing)	FM1016	FM1016	FM1015	FM1015	FM1015	FM1015	FM1015	FM1015	FM1015	FM1015
Guy Foundation, Rock: (Rambøll drawing)	FM1019	FM1019	FM1019	FM1019	FM1019	FM1019	FM1019	FM1019	FM1019	FM1019
Erection weight (kg)	5760	5400	4990	4630	4270	3910	3500	3140	2780	2420

Distribution of mast types on heights, wind categories and wind speed for 5m² + 5m² antenna area

Height	Reference wind speed 26 m/s				Reference wind speed 25 m/s				Reference wind speed 24 m/s				Reference wind speed 23 m/s				Reference wind speed 22 m/s			
	TC 1	TC 2	TC 3	TC 4	TC 1	TC 2	TC 3	TC 4	TC 1	TC 2	TC 3	TC 4	TC 1	TC 2	TC 3	TC 4	TC 1	TC 2	TC 3	TC 4
36 m	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
42 m	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
48 m	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
54 m	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
60 m	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
66 m	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
72 m	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
78 m	Normal	Normal	Light	Light	Normal	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
84 m	Normal	Normal	Light	Light	Normal	Normal	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light	Light
90 m	Normal	Normal	Light	Light	Normal	Normal	Light	Light	Normal	Light	Light	Light	Normal	Light	Light	Light	Light	Light	Light	Light

Erection weights

Guy ropes and guy tensioners are not included

Section	Section weight (kg)
S1	330
Guy Frame	50
Mast Base	160
Safety rail	5 kg/m

NOTE:

Codes
The masts are designed according to the Swedish codes BKR 99, BSK 99 and BSV 97 (Snö och vindlast, 2. ed). The structures are designed according to safety class 1 with partial coefficient gn = 1,0. For the tensile strength of guys an extra partial coefficient for guy = 1,25 is used.

Wind climate
The masts are designed for all combinations of wind speeds ranging from 22 m/s to 26 m/s and terrain categories I to IV. The mast type to be used for each particular combination is stated in table 1.

The masts are designed for a maximum allowable rotation of +/− 0,7 degrees for the characteristic wind velocity of 25 m/s constant over height.

Load
All masts are designed for a uniformly distributed wind area of 5m² over the top 6 m and a uniformly distributed wind area of 5m² from 12 m to 18 m below the mast top. In addition to this a uniformly distributed wind area from cables and feeders of 0,50 m²/m is applied to the mast up to 7 m below the top and 0,25 m²/m is applied from 2 m to 7 m below the top. A torsional contribution of 1,5 m² * m is added to the mast loading, distributed over the entire height of the mast.

Steel material
Leg member tubes and diagonal tubes are of steel quality S355JRH. Tubes for legs and diagonals are according to EN10210−1. Flange plates and gusset plates welded on legs are of steel quality S355J2G3, while ladder and cable ladder are of steel quality S235JR/S235JRG2 all according to EN10025.

Bolts in flanges between sections are of quality 8.8 with corresponding nuts in class 8 in accordance with EN 20898/1 and EN 20898/2. Structural washers are in accordance with ISO 7089/ISO 7090/DIN 125 − 200HV. Dimensions of bolts in flange plates are M20. All U−clamps shall be in stainless steel in quality as SS2333, annealed condition.

Welds
Welds between leg tubes and flange plates shall be of quality level C. (according to EN 25817 and 26520). All other welds shall be quality level D.

Guys
Guy ropes are of the spiral strand type. The rope dimension is ø13 mm with an area of 107 mm² and the construction 1x19. Wires are hot dip galvanised. Minimum breaking load of guys is 155 kN and modulus of elasticity is 160.000 MPa. Guy tensioners are of the type "stagtvinge med doble kiler".

Guy ropes are attached to the mast sections by means of a short guy tensioner. The same system is used at the foundation yet by means of a longer guy tensioner which serves as rope tensioner. The force is transferred to the guy tensioner by a wedge and a tensioned bolt secures the protruding rope end. The wedge is secured to the guy tensioner by double nuts on the threads. The lengths of the guys are cut at site by the contractor responsible for the erection of the masts.

Ladder and cable ladder
Climbing ladder and cable ladder is an integrated unit, cable steps per 600 mm and ladder steps per 300 mm. The width of the ladder steps is 400 mm and the width of the cable steps is 2 * 230 mm. The ladder is placed inside the cross section on one of the mast faces and welded to the diagonals before hot dip galvanizing.

Surface treatment
All structural steel members are hot dip galvanised according to EN/ISO 1461 with a minimum thickness of 115 µm. Structural bolts, nuts and washers are hot dip galvanised according to EN/ISO 1461. Stainless steel U−bolts shall be pickled on completion.

Rev.	Date	Prepared	Checked	Approved	Rev. Date
	2004.01.15	MON	KDA	USA	

Project Scale 1:200

RAMBØLL
36 m − 90 m Normal 5m² +5m² Masts

General note

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File TKS−M009
Drawing no. M009