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AASHTO High Mast Pole Results Page 1

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Engine Version: 1.0.5.0

Project Data File:	C:\K2_Projects\AASHTO High Mast\Test Case 4A.XML
Project Description:	Test Case 4A
Project Number:	12345
Customer Name:	Test
AASHTO Version:	LTS-5

Pole Tip Flat/Flat Width:	0.000 (in)	Pole Shape (# of flats):	12 Flats (12)
Pole Base Flat/Flat Width:	8.125 (in)	Bend Radius:	2.000 (in)
Pole Taper:	0.1400 (in/ft)	Specify Tube Dimensions Directly?	True
Pole Total Length:	30.42 (ft)	Lap Length Calculation Method:	1.5 x ID + Adder, Next Inch
		Lap Length Adder:	3.000 (in)
Number of Luminaires:	4	Pole is Embedded?	False
Luminaire Weight:	50 (lbf)	Elev of Base Above Grade:	0.000 (ft)
Luminaire Drag Coefficient:	1.00		
Luminaire Area:	3.00 (ft^2)		
Head Assembly Area:	2.00 (ft^2)		
Head Assembly Drag Coefficient:	1.00		
Head Assembly Weight:	100 (lbf)		
Head Assembly Width:	0.00 (ft)		
Surface Area for Ice Accumulation:	0.00 (ft^2)		

Load No.	Load Description	Elevation Above Base (ft)	Projected Area (ft^2)	Drag Coefficient	Weight (lbf)	Moment Arm (ft)	Along Wind Force (lbf)	Across Wind Force (lbf)
1	Load in Y direction	20.00	0.00	1.00	0.0	0.00	1000.0	0.0
2		0.00	0.00	1.00	0.0	0.00	0.0	0.0
3		0.00	0.00	1.00	0.0	0.00	0.0	0.0
4		0.00	0.00	1.00	0.0	0.00	0.0	0.0
5		0.00	0.00	1.00	0.0	0.00	0.0	0.0

Tube No.	Total Length (ft)	Exposed Length (ft)	Tube Thickness (in)	Lap Length (ft)	Yield Strength (ksi)	Top Flat/Flat (in)	Bottom Flat/Flat (in)	Bot Elev Above Bot (ft)	Bottom Connection
1	15.00	15.00	0.1250	1.08	50.00	4.175	6.275	15.42	Slip
2	16.50	15.42	0.1250	0.00	50.00	5.815	8.125	0.00	Welded

Wind Importance Factor (Ir):	1.0000	Resultant Bending Stress at Fixity:	73.737 (ksi)
Gust Effect Factor (G):	1.1400	Combined Stress Ratio at Fixity:	1.801
Velocity Conversion Factor (Cv):	1.0000	Maximum Resultant Bending Stress:	72.835 (ksi)
Coefficient of Amplification (Ca):	0.9510	Elev @ Max Res Bending Stress:	0.000 (ft)
Wind Speed (V):	105 (mph)		
Un-modified Wind Pressure (P):	28.224 (psf)	P-Delta Moment at Fixity:	2.386 (kip-ft)
Modulus of Elasticity (E):	29.00 (x 10^6 psi)	P-Delta Stress at Fixity:	3.017 (ksi)
Recurrence Interval:	50 years	Bending + P-Delta Moment at Fixity:	42.488 (kip-ft)
Region Type:	Non-Hurricane	Bending + P-Delta Stress at Fixity:	76.754 (ksi)
Fatigue Category:	I	Amplified Bending Moment at Fixity:	42.167 (kip-ft)
Ice Thickness:	0.60 (in)	Amplified Bending Stress at Fixity:	77.536 (ksi)
Ice Density:	60.00 (lbf/ft^3)		
		Maximum Combined Stress Ratio:	1.8011
Axial force at Fixity:	-0.558 (kips)	Maximum Pole Static Deflection:	36.173 (in)
X Shear at Fixity:	0.089 (kips)	Maximum Pole Dynamic Deflection:	52.451 (in)
Y Shear at Fixity:	1.888 (kips)	Dyn. Deflection as % of Height:	14.37 %
Resultant Shear at Fixity:	1.890 (kips)	Allowable Dyn. Defl. as % of Height:	15.00 %
Moment about X at Fixity:	-40.080 (kip-ft)		
Moment about Y at Fixity:	1.316 (kip-ft)	Stress Criteria was met?	False
Resultant Moment at Fixity:	40.101 (kip-ft)	Dyn. Deflection Criteria was met?	True
Torsion at Fixity:	0.000 (kip-ft)		
Resultant Shear Stress at Fixity:	1.190 (ksi)		
Torsional Shear Stress at Fixity:	0.000 (ksi)		
Total Shear Stress at Fixity:	1.190 (ksi)		
Bending Stress about X at Fixity:	73.094 (ksi)		
Bending Stress about Y at Fixity:	2.401 (ksi)		

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Vortex Shedding Analysis Results

Natural Frequency 1 (f1):	0.902 (Hz)
Natural Frequency 2 (f2):	8.372 (Hz)
Strouhal Number (S):	0.150
Critical Wind Speed 1 (Vc1):	1.385 (mph)
Critical Wind Speed 2 (Vc2):	12.849 (mph)
Damping Ratio (ß):	0.005
Fatigue Importance Factor:	1.00
Equivalent Static Pressure:	0.54 (psf)
Estimate for f1 per Eq. C11-3:	0.850 (Hz)
X Shear at Fixity:	0.002 (kips)
Y Shear at Fixity:	1.452 (kips)
Resultant Shear at Fixity:	1.452 (kips)
Moment About X at Fixity:	-33.615 (kip-ft)
Moment About Y at Fixity:	0.024 (kip-ft)
Resultant Moment at Fixity:	33.615 (kip-ft)
Resultant Torsion at Fixity:	0.000 (kip-ft)
Bending Stress About X at Fixity:	61.304 (ksi)
Bending Stress About Y at Fixity:	0.043 (ksi)
Resultant Bending Stress at Fixity:	61.315 (ksi)

Gust Loading Analysis Results

Yearly Mean Wind Speed:	11.2 (mph)
Fatigue Importance Factor:	1.00
Natural Wind Gust Pressure:	5.72 (psf)
X Shear at Fixity:	0.018 (kips)
Y Shear at Fixity:	1.165 (kips)
Resultant Shear at Fixity:	1.165 (kips)
Moment About X at Fixity:	-23.461 (kip-ft)
Moment About Y at Fixity:	0.249 (kip-ft)
Resultant Moment at Fixity:	23.463 (kip-ft)
Resultant Torsion at Fixity:	0.000 (kip-ft)
Bending Stress About X at Fixity:	42.787 (ksi)
Bending Stress About Y at Fixity:	0.455 (ksi)
Resultant Bending Stress at Fixity:	42.909 (ksi)
Max Resultant Bending Stress:	43.136 (ksi)
Ocurred at Elevation:	0.000 (feet)
Fatigue Stress Category:	B
Fatigue Stress Threshold:	16.000 (ksi)
Max Stress meets Fatigue Criteria?	False

Ice Loading Analysis Results

Axial Force at Fixity:	-0.707 (kips)
X Shear at Fixity:	0.025 (kips)
Y Shear at Fixity:	1.488 (kips)
Resultant Shear at Fixity:	1.488 (kips)
Moment About X at Fixity:	-30.832 (kip-ft)
Moment About Y at Fixity:	0.366 (kip-ft)
Resultant Moment at Fixity:	30.834 (kip-ft)
Resultant Torsion at Fixity:	0.000 (kip-ft)
Bending Stress About X at Fixity:	56.229 (ksi)
Bending Stress About Y at Fixity:	0.667 (ksi)
Resultant Bending Stress at Fixity:	56.407 (ksi)
Max Resultant Bending Stress:	56.347 (ksi)
Ocurred at Elevation:	0.000 (feet)
Maximum Combined Stress Ratio:	1.358
Total Ice Weight:	149.4 (lbf)

Baseplate Analysis Results

Baseplate Design Moment:	42.488 (kip-ft)
Number of Bolts:	4
Bolt Diameter:	2.2500 (in)
Bolt Yield Strength:	55.0 (ksi)
Baseplate Yield Strength:	50.0 (ksi)
Inner Diameter:	8.1250 (in)
Outer Diameter:	0.0000 (in)
Boltcircle Diameter:	0.0000 (in)
Bolt threads per inch:	4.5
Bolt Cross-Section Area:	3.2477 (in^2)
Bolt Shear Stress:	NaN (ksi)
Inertia of Bolt Group:	0.000 (in^4)
Bolt Tensile Stress:	NaN (ksi)
Bolt Allowable Shear Stress:	16.5 (ksi)
Bolt Allowable Tensile Stress:	27.5 (ksi)
Bolt Combined Stress Ratio:	NaN
Bolt Force:	NaN (kips)
Required Baseplate Thickness:	NaN (in)
Actual Baseplate Thickness:	0.0000 (in)
Baseplate Performance Ratio:	NaN
Weld Load (Total):	12.6875 (kip/in)
Weld Load (Top):	12.6875 (kip/in)
Weld Load (Bottom):	0.0000 (kip/in)
Req. Weld Size (Top):	0.6250 (in)
Req. Weld Size (Bot):	0.0625 (in)
Weld Size (Top):	0.0000 (in)
Weld Size (Bottom):	0.0000 (in)
Fatigue Stress (from Gust Loading):	11.295 (ksi)
Fatigue Stress Category:	E'
Fatigue Stress Threshold:	2.600 (ksi)
Bolts meet Stress Criteria?	False
Baseplate meets Stress Criteria?	False
Welds meet Stress Criteria?	False
Welds meet Fatigue Criteria?	False

Miscellaneous Results

Static Loading - Minimum Cd:	0.820
Static Loading - Maximum Cd:	1.198
Static Loading - Minimum Kz:	0.865
Static Loading - Maximum Kz:	0.984
Supress Ice Loading Analysis?	False
Desired Number of Analysis Segments:	100
Calculate Projected Width Using Point/Point Width?	True
Inertia at Fixity:	26.320 in^4
Section Modulus at Fixity:	6.580 in^3
Cross Section Area at Fixity:	3.215 in^2
Outer Radius to Flat at Fixity:	4.063 in
Outer Radius to Point at Fixity:	4.206 in