


Cooling Tower Institute
Inquiry Bid Form

Mechanical Draft Cooling Tower

Sheet 1 of 3

CUSTOMER GDA EBURRU 2 MW GEOTHERMAL PLANT NAIVASHA, KENYA	MANUFACTURER  Cooling Tower Depot, Inc. 651 Corporate Circle, Ste. 206 Golden, CO 80401 Phone (720) 746-1234 Fax (720) 746-1110
Specification No:	Proposal No.: N124-S408
Inquiry No:	Date: Orig. March 10, 2010
Date: Orig. Rev.	Date: Rev. 4-Jun-10
All data set forth herein is in accordance with definitions and standards published by the Cooling Tower Institute.	
GENERAL	
Selection Tower Model Type	HEAVY DUTY INDUSTRIAL COUNTERFLOW CFF-303023-11-20 INDUCED DRAFT COUNTERFLOW
DESIGN & OPERATING CONDITIONS	
Circulating Water Flow, u.s. M3/hr	500.00
Hot (inlet) Water Temp., deg C	42.00
Cold (outlet) Water Temp., deg C	18.00
Wet Bulb Temp., deg C Inlet Ambient	11.50
Tower Pump Head, meters	6.10
Total Fan KW, (Driver Output)	30.00 X 1 = 30.00
Drift Loss, % of circulating flow	0.0005
Evaporation Loss (at design), %	3.34
Design Wind Load, lbs./sq. ft./PA m/s	36 (80 MPH)
Design Seismic Load % G	0.6 and site specific spectral response curves
Tower Site (ground level, roof, etc.)	GROUND LEVEL
Elevation Above Sea Level, M	2600.00
Tower Exposure	UNOBSTRUCTED
STRUCTURAL DETAILS	
Number of Cells	1
Fans per Cell	1
Total Number of Fans	1
Nominal Cell Dimensions, L x W (meters)	9.14 X 9.14 = 83.60
Overall Tower Dimensions, L x W (meters)	9.14 X 9.14 = 83.60
Height - Basin Curb to Fan Deck, M	7.01
Fan Stack Height, M	1.83
Overall Tower Height, M	8.84
Inside Basin Dimensions, L x W (meters)	10.97 X 10.97 = 120.39 m ²
Column Extensions, Perimeter, M (below basin curb) Interior, M	varies 1.22 to 1.45 varies 1.22 to 1.45
Anchorage	PERIMETER

Cooling Tower Institute
Inquiry Bid Form

Mechanical Draft Cooling Tower

Sheet 2 of 3

Proposal No.: N124-S408

STRUCTURAL DETAILS (Continued)	
Hot Water Inlet - Number	1
Nominal Diameter, mm	304.80
Description	TERMINATES ONE FOOT OUTSIDE OF TOWER WITH STD ANSI FLANGE
Height Inlet Above Basin Curb, M	4.57
Access to Top of Tower	ONE FIBERGLASS STAIRWAY
Shipping Weight, lbs / kg	50,391 / 22,853.06
Operating Weight, lbs / kg	59,028 / 26,770.07
MATERIALS OF CONSTRUCTION	
Framework Members	HIGH STRENGTH PULTRUDED FIBERGLASS
Casing	12 OZ FIRE RETARDANT FIBERGLASS
Fill Media	10 MIL (15 MIL 1ST LAYER) PVC FILM PACK FILL - NESTED SHEETS
Fill Support	HIGH STRENGTH PULTRUDED FIBERGLASS
Drift Eliminators	15 MIL CELLULAR PVC
Spacer	PVC
Fan Stacks	FIRE RETARDANT FIBERGLASS
Louver Material	N/A
Partitions	N/A
Fan Deck	HIGH STRENGTH PULTRUDED FIBERGLASS
Water Distribution - Type	LOW PRESSURE DOWN SPRAY
Material	PVC HEADER/PVC LATERALS
Lumber Pre-Treatment	N/A
Type of Treatment	N/A
Items Treated	N/A
Splashers or Spray Nozzles	POLYPROPYLENE
Stairway and Handrail	FIBERGLASS
Structural Connectors	316 SERIES SS
Ring Joint Connectors	316 SERIES SS
Bolts, Nuts, Washers	316 SERIES SS
Anchor Connectors	316 SERIES SS
Nails	316 SERIES SS
Mechanical Equipment Support	UNITIZED TRIPLE EPOXY COATED STEEL
Anchor Bolts - Material	316 SERIES SS
Furnished by	CTD
Cold Water Basin - Material	CONCRETE
Furnished by	BY OTHER
Basin Accessories, by Mfg.	NONE
MECHANICAL EQUIPMENT	
Fans	
Number	1
Type or Model	APT-20K-6
Manufacturer	HUDSON PRODUCTS
Diameter, ft / M	20 / 6.0957
Number of Blades	6

Cooling Tower Institute
Inquiry Bid Form

Mechanical Draft Cooling Tower

Sheet 3 of 3

Proposal No.: N124-S408

MECHANICAL EQUIPMENT (Continued)	
Fans	
Fan Speed, rpm	195.80
Tip Speed, fpm / mpm	12,303.00 / 3,749.95
KW per Fan, Driver Output	30.00
Blade Material	FIBERGLASS REINFORCED VINYL ESTER
Hub Material	TRIPLE EPOXY COATED STEEL/DUCTILE IRON CLAMPS/HDG HRDWR
Total Static Pressure, in H2O	0.327
Velocity Pressure, in H2O	0.102
Air Delivery per Fan, ACFM / m3/s	436,242.00 / 205.88
Fan Static Efficiency, %	59.2
Fan Total Efficiency, %	77.6
Speed Reducer	
Number	1
Type	RIGHT ANGLE, SPIRAL BEVEL
Model	175
Manufacturer	AMARILLO
Reduction Ratio	7.56:1
AGMA Mechanical H.P. Rating / kw	132 / 98.43
Service Factor at Rated H.P. of Driver	2.64
Number of Reductions	1
Drive Shaft	
Number	1
Type	FULL FLOATING NON-LUBRICATED
Model	LRF375.275 SS
Manufacturer	ADDAX
Rated kw	93.21
Drive Shaft Material	COMPOSITE
Coupling Material	316 STAINLESS STEEL
Driver	
Number	1
Kind	ELECTRIC MOTOR
Type	IC411 / IP55
	ONE SPEED
Manufacturer	BALDOR
Full Load Speed, RPM	1500
Electric Characteristics - phase/cycles/volts	3/50/415
Rated hp / kw	50.00 / 37.00
Space Heater	200V-240V
ADDITIONAL DATA:	
925 MANHOURS REQUIRED FOR TOWER AND FILL ASSEMBLY	

C

C

C

C

COOLING TOWER SPECIFICATIONS AND EQUIPMENT DATA SHEET

TOWER MODEL NUMBER	CFF-303023-11-20
CUSTOMER NAME	GDA
CONTRACT NUMBER	1034-18
CTD JOB NUMBER	10-105
LOCATION	KENYA AFRICA
COMPLETION DATE	DELIVER TO RENO, NV 07-10

PERFORMANCE DATA

WATER CIRCULATION, US GPM	2201 (500 M ³ /HR)
INLET WATER CIRCULATION TEMPERATURE (°F)	107.6 (42 DEGREES C)
OUTLET WATER TEMPERATURE (°F)	64.4 (18 DEGREES C)
DESIGN WET BULB TEMPERATURE (°F)	52.7 (11.5 DEGREES C)
ELEVATION (FT)	8,530 (2,600 M)

TOWER DESIGN DATA

TYPE	COUNTERFLOW
NUMBER OF CELLS	ONE
CELL SIZE (FT x FT)	30 X 30 (9,144 mm X 9,144 mm)
OVERALL LENGTH/WIDTH (FT x FT)	30 X 30 (9,144 mm x 9,144 mm)
BASIN CURB TO DISTRIBUTION CENTER LINE (FT)	23 (7.01 M)
DISTRIBUTION TYPE	
DRIFT LOSS (% CIRCULATION)	0.0005
DRIFT ELIMINATOR TYPE	TRIPLE PASS PVC
FILL TYPE	TOP LAYER 1' (305 mm) 0F21 PVC PLUS 6 FT (1.828 M) OF VF19+ PVC
ACCESS TO TOP OF TOWER	ONE FRP STAIRWAY
FAN DECK LIVE LOAD (PSF)	60 (2.87 kPa)
SNOW LOAD (PSF)	0
DESIGN WIND VELOCITY (MPH)	80 (36 M/S)
Design Seismic Load, %G	0.60

MATERIALS

STRUCTURE	HIGH STRENGTH FR FRP
BOLTING HARDWARE	316 SS
NAILING HARDWARE	316 SS
BASE ANCHORS	316 SS
JOINT CONNECTORS	316 SS / POLYPROPELENE
GEAR SUPPORT MEMBERS	TRIPLE EPOXY COATED STEEL
FAN STACK	FR FRP WITH ACCESS PANEL
DISTRIBUTION HEADERS/LATERAL LINES	SCH 40 PVC
DISTRIBUTION SPRAY NOZZLES	POLYPROPYLENE
DRIFT ELIMINATORS	15 ML PVC. .0005 DRIFT LOSS
FILL	10 ML (15 ML TOP LAYER) PVC
CASING	12 oz/sq ft (3.66 kg / m ²) FR FRP
FAN DECK	1-1/2" (38 mm) THICK FR FRP CHANNEL DECK

FAN DATA

TYPE	ADJUSTABLE PITCH
MANUFACTURER	HUDSON
MODEL NUMBER	APT-20K-6
DIAMETER (FT)	20 (6.1 M)
BLADES/FAN	SIX
BLADE MATERIAL	FRP
HUB MATERIAL	TRIPLE EPOXY COATED STEEL
FAN SPEED (RPM)	195.8
TIP SPEED (FPM)	12,303 (3,750 M/hour)
FAN AT DESIGN CONDITIONS (CFM)	436,150 (12,350 m ³ /minute)
TOTAL STATIC PRESSURE DROP (IN. OF H ₂ O)	0.303
RECOMMENDED TRIAL FAN PITCH (DEG)	5.5 DEGREES
REQUIRED BHP AT DESIGN	37.4
BORE (INCHES)	2.125 (647 mm)
FAN SHAFT KEYWAY (INCHES x INCHES)	0.50"X0.25" (12mm x 6mm)

VIBRATION SWITCH

MANUFACTURER	TRANSDUCER BY OTHERS
MODEL	N/A

GEAR

TYPE	RIGHT ANGEL SPIRAL BEVEL
MANUFACTURER	AMARILLO
MODEL NUMBER	175
RATED CAPACITY (HP)	132 (98.43 Kw)
REDUCTION RATIO	7.56
REVERSING OR NON-REVERSING	Reversing
SLOW SPEED SHAFT DIAMETER (INCHES) FAN SIDE	2.999" (76mm)
FAN SHAFT KEYWAY (INCHES x INCHES)	0.75"x0.375" (19mm x 9mm)
HIGH SPEED BORE DIAMETER (INCHES)	1.874" (48mm)
INPUT SHAFT KEYWAY (INCHES x INCHES)	0.375"x0.1875" (9mm x 5 mm)

DRIVE SHAFT DATA

DRIVE SHAFT MANUFACTURER	ADDAX
MODEL NUMBER	LRF375.275
MATERIAL	COMPOSITE FIBER
SHAFT LENGTH (INCHES)	103" (2,616 mm)
GEAR END BORE DIAMETER (INCHES)	1.874" (48mm)
GEAR SHAFT KEYWAY (INCHES x INCHES)	0.375"x0.1875" (9mm x 5 mm)
MOTOR END BORE DIAMETER (INCHES)	2.125 (647 mm)
MOTOR SHAFT KEYWAY (INCHES x INCHES)	0.50"X0.25" (12mm x 6mm)

MOTOR DATA

TYPE	TEFC IC411 / IP55
FRAME SIZE	D200M
MANUFACTURER	BALDOR
RATED CAPACITY (HP)	50 (37Kw)
OPERATING SPEED (RPM)	1500
VOLTS/PHASE/CYCLE	415 / 3 / 50
MOTOR END BORE DIAMETER (INCHES)	2.125 (647 mm)
MOTOR SHAFT KEYWAY (INCHES x INCHES)	0.50"X0.25" (12mm x 6mm)
LOCKOUT SPEEDS	Below 450 RPM unless oil pump option is purchased.