

Tech 2: Towson Arena
Tech 2: Final Submission

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The Towson Center Arena Addition Towson, MD

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Table of Contents

Executive Summary	3
Summary Description of Distribution System:	3
Utility Company Information	3
Service Entrance	4
Voltage Systems	4
Emergency Power System	4
Locations of Switchgear	4
Over-current Devices	8
Transformers	8
Grounding	10
Special Equipment	10
Lighting Loads	10
Lighting Control	13
Mechanical and Other Loads	14
Service Entrance Size	22
Environmental Stewardship Design	23
Design Issues	23
Drawings	24
Communication Systems	24
Appendix A	25

Executive Summary:

The following report goes into depth on the electrical aspects of the Towson Center Arena Addition at the Towson University in Towson, Maryland. A background is presented on how the arena receives energy from the utility and how the energy is distributed throughout the building. The electrical and mechanical equipment are displayed in tabular format to show information such as tag, voltage, load, location and phase. There is also an in depth analysis of the lighting fixtures used on the arena addition. This section describes the different lamps, ballasts and lighting controls used in the building. The electrical requirements for the lighting equipment were also assessed. Mechanical and plumbing schedules were refined to better present the electrical needs of the systems. The equipment is presented again in tabular form showing tag, electrical usage and NEC current considerations. A single diagram presents the electrical distribution system for the entire building. This information was gathered from the existing riser diagram. Finally there are calculations for the building's service entrance size and requirements by NEC.

Summary Description of Distribution System:

The arena's electrical system has a 13.2 kV service entrance, on the first floor, in the main electrical room. It comes from the utility company, BG&E. There is a 15 kV load interrupter switch and a 15 kV fused load interrupter switch. There is a 3000 KVA transformer with a 13.2 kV primary and a 277/480 secondary in the main electrical room on the first floor. The main section is 4000 amps and has a 35k AIC 100% rated circuit breaker. There is a 4000 amp main lugs and two sections of the 277/480 distribution panel.

Utility Company Information:

The Utility Company on the project is Baltimore Gas and Electric. Their phone number is 1.800.685.0123, and their website can be found at:

<http://www.bge.com/Pages/default.aspx>

They are located at:

Baltimore Gas & Electric Co

110 West Fayette Street

Baltimore, MD 21201

The building is connected to a campus system and is charged one rate. The designed rate was \$0.1166/kWh. This cost was the combination of the "Delivery Service Customer Charge" a flat monthly

Tech 2: Towson Arena

rate, "Demand Charges" per kWh, and Delivery Service Charge per kWh. Towson University is charged for primary service, but it is unknown at this point whether Schedule GL or Schedule P applies. These two schedules may be found at:

<http://www.bge.com/myaccount/billsrates/ratestariffs/electricservice/Pages/Electric-Services-Rates-and-Tariffs.aspx>

Service Entrance:

The utility company, Baltimore Gas and Electric, has two 15 kV feeders serve two of Towson's existing to remain switchgear. Two 15 kV feeders then enter the building underground in the main electric room on the first floor. At the entrance there are two 15 kV interrupter switches and a 15 kV fused interrupter switch. There is also a 3000 KVA transformer with a 13.2 kV primary and 277/480 secondary. Towson University monitors all of their buildings' electricity usage with their own metering system.

Voltage Systems:

Electricity is provided to the arena via Baltimore Gas and Electric at 13.2 kV. Transformers step down this service to 277/480 V and 120/208 V. Items on the 277/480 voltage system include lighting, pumps, fans, cooling towers, snow melting systems and elevators. Items on the 120/208 voltage system include receptacles, control panels, door operators, hand dryers, telescoping seating and company switches.

Emergency Power System:

The emergency power system has three natural gas generators that are 277/480V, 3 phase, 4W, 150KW. They serve four automatic transfer switches. The automatic transfer switches serve the fire pump, the panelboard for smoke evacuation fans, the emergency panelboard for life safety loads, and the standby panelboard for standby loads.

Battery life expectancy for exit signs is 20 years, minimum. The batteries will have power for 24 hours plus 15 minutes of power for alarm capabilities. Recharge time is approximately four hours if batteries are completely discharged.

Locations of Switchgear:

Certain equipment appears on the floor plans, but not on the riser diagrams and vice versa. Equipment that doesn't show up on the riser diagram and does on the floor plans includes receptacles,

Tech 2: Towson Arena

data outlets, circuit wiring, home runs, fire alarm strobes, fire alarm pull stations, fire alarm horns, cameras and electric motor connections. Equipment that shows up in the riser diagram but not the floor plans includes automatic transfer switches, disconnecting switches, circuit breaker locations, fire pumps, surge protective devices, switchboards, switchgear, generators and generator remote alarm annunciator panels.

Switchgear and transformers are located outside. Three switchgear and three generators access the building via the main electrical room. Electrical closets are located at opposite east and west sides of the arena.

Tech 2: Towson Arena

Equipment Tag	Equipment Type	Floor	Room #	Room Name	Drawing #	Enlarged Plan #
SWB	SWITCHBOARD	1	116	Electrical	E2.01	E4.01
DP1	Distribution Panel	1	116	Electrical	E2.01	E4.01
DCSP	Distribution Panel	1	116	Electrical	E2.01	E4.01
TDP1	TRANSFORMER	1	116	Electrical	E2.01	E4.01
TDCSP	TRANSFORMER	1	116	Electrical	E2.01	E4.01
TMRP1	TRANSFORMER	1	151	MAIN CHILLER	E2.01	E4.01
TERP1	TRANSFORMER	1	116	Electrical	E2.01	E4.01
TSRP1	TRANSFORMER	1	116	Electrical	E2.01	E4.01
TRP2	TRANSFORMER	2	246	ELECTRICAL ROOM	E2.03	
TRP2B	TRANSFORMER	2	227	ELECTRICAL ROOM	E2.03	
TRP3A	TRANSFORMER	3	325	MECHANICAL	E2.05	
TRP4	TRANSFORMER	TRUSS LVL		ABOVE SKYBOX	E2.07	
TRP4A	TRANSFORMER	TRUSS LVL		CATWALK	E2.07	
TRCT	TRANSFORMER	ROOF PLAN		SERVICE YARD	E2.08	
GENERATOR 1	GENERATOR	SITE			ES1.01	
GENERATOR 2	GENERATOR	SITE			ES1.01	
GENERATOR 3	GENERATOR	SITE			ES1.01	
ATS-1	TRANSFER SWITCH	1	116	ELECTRICAL	E2.01	E4.01
ATS-3	TRANSFER SWITCH	1	116	ELECTRICAL	E2.01	E4.01
ATS-5A	TRANSFER SWITCH	1	116	ELECTRICAL	E2.01	E4.01
ATS-5B	TRANSFER SWITCH	1	116	ELECTRICAL	E2.01	E4.01

Tech 2: Towson Arena

Equipment Tag	Voltage System Designation	Main Type	Main Size	Bus Size	Floor	Room #	Room Name	Drawing #	Enlarged Plan #
DP1	120/208	MCB	800	800	1	116	ELECTRICAL	E2.01	E4.01
DCSP	120/208	MCB	800	800	1	116	ELECTRICAL	E2.01	E4.01
EP1	277/480	MCB	225	800	1	116	ELECTRICAL	E2.01	E4.01
EP1A	277/480	MCB	100	800	1	146	ELECTRICAL	E2.01	E4.01
EP2	277/480	MCB	100	800	2	246	ELECTRICAL	E2.03	
EP2A	277/480	MCB	60	800	2	227	ELECTRICAL	E2.03	
EP4	277/480	MCB	100	800			ABOVE SKYBOX	E2.07	
ERP1	120/208	MCB	50	800	1	116	ELECTRICAL	E2.01	E4.01
LP1	277/480	MCB	100	800	1	116	ELECTRICAL	E2.01	E4.01
LP1A	277/480	MCB	100	800	1	146	ELECTRICAL	E2.01	E4.01
LP2	277/480	MCB	200	800	2	246	ELECTRICAL	E2.03	
LP2A	277/480	MCB	200	800	2	227	ELECTRICAL	E2.03	
LP4	277/480	MCB	400	800			ABOVE SKYBOX	E2.07	
MCT	277/480	MCB	300	800			SERVICE YARD	E2.07	
MP1	277/480	MCB	400	800	1	151	MAIN CHILLER	E2.01	E4.01
MP1A	277/480	MCB	175	800	1	146	ELECTRICAL	E2.01	E4.01
MP3	277/480	MCB	225	800	3	325	MECHANICAL	E2.05	
MP4	277/480	MCB	175	800			ABOVE SKYBOX	E2.07	
MP5A	277/480	MCB	225	800			TA-AHU-8	E2.07	
MP5B	277/480	MCB	225	800			TA-AHU-9	E2.07	
MRP1	120/208	MCB	100	800	1	151	MAIN CHILLER	E2.01	E4.01
RCT	120/208	MCB	50	800			SERVICE YARD	ES1.01	
RP1	120/208	MCB	225	800	1	116	ELECTRICAL	E2.01	E4.01
RP1A	120/208	MCB	400	800	1	146	ELECTRICAL	E2.01	E4.01
RP1B	120/208	MCB	100	800	1	118	MAINT SHOP	E2.01	E4.01
RP1C	120/208	MCB	100	800	1	122	SECURITY	E2.01	E4.01
RP2	120/208	MCB	225	800	2	246	ELECTRICAL	E2.03	
RP2A	120/208	MCB	MLO	800	2	244	CONCESSIONS	E2.03	E4.03
RP2B	120/208	MCB	250	800	2	227	ELECTRICAL	E2.03	
RP2C	120/208	MCB	MLO	800	2	229	CONCESSIONS	E2.03	E4.03
RP3	120/208	MCB	125	800	3	315	PREP	E2.05	
RP3A	120/208	MCB	100	800	3	325	MECHANICAL	E2.05	
RP4	120/208	MCB	400	800			ABOVE SKYBOX	E2.07	
RP4A	120/208	MCB	250	800			CATWALK	E2.07	
SM1	277/480	MCB	125	800	1	116	ELECTRICAL	E2.01	E4.01
SM1A	277/480	MCB	300	800	1	146	ELECTRICAL	E2.01	E4.01
SP1	277/480	MCB	150	800	1	116	ELECTRICAL	E2.01	E4.01
SRP1	120/208	MCB	100	800	1	116	ELECTRICAL	E2.01	E4.01
SRP1A	120/208	MCB	150	800	1	146	ELECTRICAL	E2.01	E4.01
SE4A	277/480	MCB	150	800			ABOVE SKYBOX	E2.07	
SE4B	277/480	MCB	150	800			ABOVE SKYBOX	E2.07	

Over-current Devices:

The Towson arena uses multiple over-current devices throughout the building. There are fuses and circuit breakers. Before entering the system, circuit breakers separate the generators from the main system. From the utility company, power goes to the system through load interrupter switches and a fused load interrupter switches. There are surge protective devices and circuit breakers enclosed in panelboards throughout the building. Branch circuits and distribution panels have circuit breakers enclosed, protecting them. Typical AIC rating for distribution panels is 22k, and for branch circuits the AIC ratings range from 10k to 25k. Branch circuits have mains and typically all have circuit breakers.

Transformers:

Medium voltage transformers are dry-type with two 2.5 percent full capacity above normal and two 2.5 percent full capacity below normal primary taps. The temperature rise average is 115 degrees C above 40 degrees C maximum, 30 degrees C average ambient. Impedance is not less than 5.75 percent.

Low voltage transformers are dry-type with four 2.5 percent rated taps, two below and two above rated primary voltages. Low voltage transformers below 15 kVA have a Class 150 maximum temperature rise, and those 15 kVA and higher are Class 220 for maximum temperature rise. For transformers below 15 kVA the temperature rise under full load conditions has a maximum temperature not exceeding 115 degrees C when operating in 40 degrees C as an ambient temperature. Transformers sized 15kVA and higher have a maximum temperature not exceeding 150 degrees during full load conditions in a 40 degrees C ambient temperature.

Tag	Primary V	Secondary V	SIZE	TYPE	TEMP. RISE	TAPS	MOUNTING	REMARKS
TDP1	480, 3PH, 3W	208Y/120V, 3PH, 4W	225	DRY	150 DEGREE C	(2) + 2.5% (2) - 2.5%	PAD MOUNTED ON FLOOR	N/A
TDCSP	480, 3PH, 3W	208Y/120V, 3PH, 4W	225	DRY	150 DEGREE C	(2) + 2.5% (2) - 2.5%	PAD MOUNTED ON FLOOR	N/A
TMRP1	480, 3PH, 3W	208Y/120V, 3PH, 4W	30	DRY	150 DEGREE C	(2) + 2.5% (2) - 2.5%	PAD MOUNTED ON FLOOR	N/A
TERP1	480, 3PH, 3W	208Y/120V, 3PH, 4W	15	DRY	115 DEGREE C	(2) + 2.5% (2) - 2.5%	PAD MOUNTED ON FLOOR	N/A
TSRP1	480, 3PH, 3W	208Y/120V, 3PH, 4W	30	DRY	150 DEGREE C	(2) + 2.5% (2) - 2.5%	PAD MOUNTED ON FLOOR	N/A
TRP2	480, 3PH, 3W	208Y/120V, 3PH, 4W	75	DRY	150 DEGREE C	(2) + 2.5% (2) - 2.5%	PAD MOUNTED ON FLOOR	N/A
TRP2B	480, 3PH, 3W	208Y/120V, 3PH, 4W	75	DRY	150 DEGREE C	(2) + 2.5% (2) - 2.5%	PAD MOUNTED ON FLOOR	N/A
TRP3A	480, 3PH, 3W	208Y/120V, 3PH, 4W	30	DRY	150 DEGREE C	(2) + 2.5% (2) - 2.5%	PAD MOUNTED ON FLOOR	N/A
TRP4	480, 3PH, 3W	208Y/120V, 3PH, 4W	112.5	DRY	150 DEGREE C	(2) + 2.5% (2) - 2.5%	WALL MOUNTED	N/A
TRP4A	480, 3PH, 3W	208Y/120V, 3PH, 4W	75	DRY	150 DEGREE C	(2) + 2.5% (2) - 2.5%	WALL MOUNTED	N/A
TRCT	480, 3PH, 3W	208Y/120V, 3PH, 4W	15	DRY	115 DEGREE C	(2) + 2.5% (2) - 2.5%	PAD MOUNTED ON FLOOR	N/A

Grounding:

Grounding conductor size is shown on the riser diagrams for transformers and the main electrical panel on drawing E6.01. The electrical panel drawings E6.05 – E6.10 include the size of the grounding conductor. It is also shown on the enlarged plans of the electrical rooms. Grounding rods and busbar connections are shown on the enlarged electrical room plans on drawing E4.01.

Special Equipment:

The Towson Arena has three 150 kW generators that feed the system through four automatic transfer switches. All three are natural gas, 277/480V, 3 phase and 4 wires. The generators are outside the arena in the service yard.

Lighting Loads:

The Towson Arena is a large addition that has many lighting systems with various different lighting fixtures. Most of the fixtures use compact fluorescent, linear fluorescent or LED lamps. Several of the compact fluorescent and linear fluorescent fixtures have dimming ballasts with them, and the LEDs range from linear light sources to exterior handrails.

Luminaire Table										
	Lamp					Luminaire				
Tag	Source	Lamp	Wattage	No.	Ballast	Voltage	Watts	B.F.	Current	P.F.
A1	CFL	F26TBX/841	26	111	PS	277	26	1.1	0.11	N/A
A1D	CFL	F42TBX/841	42	44	PS	277	46	0.98	0.17	N/A
A2	CFL	F26TBX/841	26	83	PS	277	26	1.1	0.11	N/A
A2D	CFL	F42TBX/841	42	9	PS	277	46	0.98	0.17	N/A
A3	CFL	F26TBX/841	26	35	PS	277	26	1.1	0.11	N/A
A4	CFL	F26TBX/841	26	1	PS	277	26	1.1	0.11	N/A
A5	CMH	CMH70PAR30/FL	70	10	MAG.	277	88	1	0.4	0.9
A5E	CMH	CMH70PAR30/FL	70	11	MAG.	277	88	1	0.4	0.9
A6D	CFL	F42TBX/841	42	11	PS	277	46	0.98	0.17	N/A
A7D	CFL	F26TBX/841	26	73	PS	277	26	1.1	0.11	N/A
A8D	LED	900LM LED/35K	N/A	12	N/A	277	N/A	N/A	N/A	N/A
A9	CFL	F32TBX/841	32	4	PS	277	36	0.98	0.13	N/A
A10	FL	F18TBX/841	18	0	PS	277	20	1.05	0.08	N/A
B1	CFL	F42TBX/841	42	9	PS	277	46	0.98	0.17	N/A
B1D	CFL	F42TBX/841	42	0	PS	277	46	0.98	0.17	N/A
B1P	CFL	F42TBX/841	42	21	PS	277	46	0.98	0.17	N/A

Tech 2: Towson Arena

B2	CFL	F42TBX/841	42	0	PS	277	46	0.98	0.17	N/A
B1W	CFL	F42TBX/841	42	0	PS	277	46	0.98	0.17	N/A
B3D	CFL	F26TBX/841	26	12	PS	277	26	1.1	0.11	N/A
B4P	LED	2200LM LED/41K	N/A	92	N/A	277	N/A	N/A	N/A	N/A
C1D	FL	F28T5/835	28	5	PS	277	31	1.05	0.12	N/A
C2D	LED	4000K LED	N/A	2	N/A	277	N/A	N/A	N/A	N/A
C3D	LED	2700 LED	N/A	5	N/A	277	N/A	N/A	N/A	N/A
D1	LED	COLOR-CHANGING RGB LED'S	N/A	70	N/A	277/24	N/A	N/A	N/A	N/A
F1D	FL	F21T5/841	21	43	PS	277	25	1.06	0.1	N/A
	FL	F28T5/841	28	0	PS	277	31	1.05	0.12	N/A
	FL	F35T5/841	35	0	PS	277	34	0.9	0.13	N/A
	LED	450LM LED/MR16/4K	N/A	0	N/A	277	N/A	N/A	N/A	N/A
F2D	FL	(2) F28T5/841 PER 8' RUN	28	10	PS	277	61	1	0.23	N/A
F3D	FL	(2) F54T5HO/841 PER 8' RUN	54	25	PS	277	117	1	0.43	N/A
F4	FL	F28T5/841	28	38	PS	277	31	1.05	0.12	N/A
F5D	FL	(2) F21T5/841	21	12	PS	277	49	1.02	0.19	N/A
F6	FL	(2) F28T5/841 PER 8' RUN	28	0	PS	277	61	1	0.23	N/A
F7D	FL	(2) F28T5/841 PER 4' RUN	28	23	PS	277	61	1	0.23	N/A
F8	FL	(1) F28T5/841 PER 4' LENGTH	28	3	PS	277	31	1.05	0.12	N/A
F9	FL	F24T5HO/841	24	6	PS	277	27	1.02	0.1	N/A
F10	FL	(2) F28T5/841	28	0	PS	277	61	1	0.23	N/A
F11	FL	(2) F28T5/841	28	0	PS	277	61	1	0.23	N/A
F12	FL	(1) F28T5/841	28	6	PS	277	31	1.05	0.12	N/A
F13	FL	(2) F28T5/841	28	0	PS	277	61	1	0.23	N/A
F14	FL	(2) F28T5/841	28	0	PS	277	61	1	0.23	N/A
G1	FL	(2) F14T5/841	14	36	PS	277	33	1.04	0.13	N/A
G1D	FL	(2) F14T5/841	14	8	PS	277	33	1.04	0.13	N/A
G2	FL	(2) F28T5/841	28	10	PS	277	61	1	0.23	N/A
G2D	FL	(2) F28T5/841	28	0	PS	277	61	1	0.23	N/A
G3	FL	(3) F28T5/841	28	13	PS	277	61	1	0.23	N/A
G4	FL	(2) F28T5/841	28	12	PS	277	61	1	0.23	N/A

Tech 2: Towson Arena

G5	FL	(2) F28T5/841	28	153	PS	277	61	1	0.23	N/A	
G6	FL	(2) F14T5/841	14	36	PS	277	33	1.04	0.13	N/A	
G7	FL	(2) F14T5/841	14	2	PS	277	33	1.04	0.13	N/A	
G8	FL	(2) F14T5/841	14	19	PS	277	33	1.04	0.13	N/A	
G9	FL	(2) F14T5/841	14	38	PS	277	33	1.04	0.13	N/A	
H1	CMH	CMH150/T6/942	150	3	MAG	.	277	186	1	0.7	0.9
H2	FL	(2) F28T5/841	28	4	PS	277	61	1	0.23	N/A	
H2 A	FL	(2) F28T5/841	28	11	PS	277	61	1	0.23	N/A	
H3	FL	(2) F28T5/841	28	68	PS	277	61	1	0.23	N/A	
H4	FL	F32TBX/841	32	63	PS	277	36	0.98	0.13	N/A	
H5	CMH	150W MH	150	4	MAG	.	277	186	1	0.7	0.9
J1	LED	RGB/LED	N/A	70	N/A	120	N/A	N/A	N/A	N/A	
J2	LED	3000K/LED	N/A	22	N/A	120	N/A	N/A	N/A	N/A	
J3	N/A	MSD1200/1CT	N/A	0	N/A	277	N/A	N/A	N/A	N/A	
J5	LED	4000K/LED	N/A	0	N/A	277	N/A	N/A	N/A	N/A	
K1	CMH	CMH39/T6/942	39	28	MAG	.	277	61	4	0.2	0.9
S1	FL	6-F42PLT/841,2-F42PLT/830	42	69	PS	277	46	0.98	0.17	N/A	
S2	CMH	CMH70CU942MED/O	70	35	MAG	.	277	88	1	0.4	0.9
S2E	CMH	CMH70CU942MED/O	70	25	MAG	.	277	88	1	0.4	0.9
S4	MH	VENTURE MH1000VBD	1000	36	MAG	.	277	1103	1	4.1	0.9
X	LED	LED	N/A	58	N/A	277	N/A	N/A	N/A	N/A	

Tech 2: Towson Arena

Y	EMER G	INCLUDED	N/A	0	N/A	277	N/A	N/A	N/A	N/A
AA	LED	4000K LED	N/A	1	N/A	277	N/A	N/A	N/A	N/A
BB	LED	4000K LED	N/A	1 1	N/A	277	N/A	N/A	N/A	N/A
CC	CFL	F32TBX/841	32	4	PS	277	36	0.9 8	0.13	N/A
DD	CFL	(2) F32TBX/841	32	2 2	PS	277	68	0.9 8	0.25	N/A
FF	MH	MH100/C/U/MED	100	0	MAG .	277	119	1	0.5	0.9
FF1	MH	MH100/C/U/MED	100	3	MAG .	480	120	1	0.3	0.9
GG	MH	MH150/C/U/MED	150	7	MAG .	277	186	1	0.7	0.9
HH 1	MH	(1) 250W MH	250	0	MAG .	480	280	1	0.65	0.9
HH 2	MH	(2) 250W MH	250	0	MAG .	480	280	1	0.65	0.9
JJ	MH	PSMH150/C/U/MED	150	1 4	MAG .	277	186	1	0.7	0.9
KK	CFL	F32TBX/841	32	5	PS	277	36	0.9 8	0.13	N/A
LL	CMH	CMH39T6/841	39	2 0	MAG .	277	61	4	0.2	0.9
MM	CFL	(1) F42TBX/841	42	1 4	PS	277	46	0.9 8	0.17	N/A

Lighting Control:

The Towson Arena's lighting control system includes energy savings analysis software, occupancy sensors and daylight harvesting. The lighting control system software will include a graphical interface based on floor plans of the building that show real-time system status. This includes on/off status, lighting levels and necessary maintenance issues. The software will also allow easy reprogramming and the adjustment of location setpoints. During owner defined unoccupied times, the building lighting system for normal and emergency lighting can be turned off. However, local override controls will be in the spaces with a 2 hour allowable time. Electric lighting in spaces with daylight harvesting will be dimmed to save energy.

Tech 2: Towson Arena

The court lighting is grouped into three zones that are separated according to practice courts. The fixtures shall have stepped dimming of 25%, 50% and 75%. In addition center court spotlights will allow a full spectrum of color to be controlled from a video room.

Occupancy sensors will be used in various spaces. They will be programmed to turn the lighting off after 15 minutes of the room being vacant. The sensors will also be programmed with vacancy settings.

Mechanical and Other Loads:

The mechanical system has an auto-occupied-unoccupied control system. The Towson Arena has 10 AHUs and the Towson Center has 5 AHUs. There is a VAV system, ductless split system and energy recovery unit. The Towson Arena has a 300 hp packaged hot water boiler and a 400 ton centrifugal type chiller.

MECHANICAL EQUIPMENT TABLE												
Load				Characteristics								
Tag	Desc	Mag.	Units	NEC	Volt	Phase(s)	P.F	kVA	kW	No	kVA	kW
TA-AHU-1	R FAN	7.5	HP	13.6	480	3	0.9	11.31	10.18	1	11.31	10.18
TA-AHU-1	S FAN	25	HP	43	480	3	0.9	35.75	32.17	1	35.75	32.17
TA-AHU-2	R FAN	10	HP	18	480	3	0.9	14.96	13.47	1	14.96	13.47
TA-AHU-2	S FAN	20	HP	34	480	3	0.9	28.27	25.44	1	28.27	25.44
TA-AHU-3	R FAN	3	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-AHU-3	S FAN	7.5	HP	13.6	480	3	0.9	11.31	10.18	1	11.31	10.18
TA-AHU-4	R FAN	N/A	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-AHU-4	S FAN	3	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-AHU-5	R FAN	1	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-AHU-5	S FAN	3	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-AHU-6	R FAN	5	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-AHU-6	S	15	HP	27	480	3	0.9	22.45	20.2	1	22.45	20.2

Tech 2: Towson Arena

	FAN								0			0
TA-AHU-7	R FAN	5	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-AHU-7	S FAN	7.5	HP	13. 6	480	3	0.9	11.31	10.1 8	1	11.31	10.1 8
TA-AHU-8	R FAN	40	HP	67	480	3	0.9	55.70	50.1 3	1	55.70	50.1 3
TA-AHU-8	S FAN	75	HP	123	480	3	0.9	102.2 6	92.0 3	1	102.2 6	92.0 3
TA-AHU-9	R FAN	40	HP	67	480	3	0.9	55.70	50.1 3	1	55.70	50.1 3
TA-AHU-9	S FAN	75	HP	123	480	3	0.9	102.2 6	92.0 3	1	102.2 6	92.0 3
TA-AHU-10	R FAN	1.5	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-AHU-10	S FAN	5	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-EF-1	E FAN	2	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-EF-2	E FAN	1	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-EF-3	E FAN	1	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-EF-4	E FAN	0.25	HP	5.8	120	1	0.9	0.70	0.63	1	0.70	0.63
TA-EF-5	E FAN	0.25	HP	5.8	120	1	0.9	0.70	0.63	1	0.70	0.63
TA-EF-6	E FAN	0.12 5	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
TA-EF-7	E FAN	2	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-EF-8	E FAN	0.75	HP	13. 8	120	1	0.9	1.66	1.49	1	1.66	1.49
TA-EF-9	E FAN	0.12 5	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
TA-EF-10	E FAN	1	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-EF-11	E FAN	0.5	HP	9.8	120	1	0.9	1.18	1.06	1	1.18	1.06
TA-EF-12	E FAN	0.33	HP	7.2	120	1	0.9	0.86	0.78	1	0.86	0.78
TA-EF-13	E FAN	0.33	HP	7.2	120	1	0.9	0.86	0.78	1	0.86	0.78
TA-EF-14	E FAN	15	HP	27	480	3	0.9	22.45	20.2 0	1	22.45	20.2 0
TA-EF-15	E	15	HP	27	480	3	0.9	22.45	20.2	1	22.45	20.2

Tech 2: Towson Arena

	FAN								0			0
TA-EF-16	E FAN	15	HP	27	480	3	0.9	22.45	20.2 0	1	22.45	20.2 0
TA-EF-17	E FAN	15	HP	27	480	3	0.9	22.45	20.2 0	1	22.45	20.2 0
TA-EF-18	E FAN	15	HP	27	480	3	0.9	22.45	20.2 0	1	22.45	20.2 0
TA-EF-19	E FAN	15	HP	27	480	3	0.9	22.45	20.2 0	1	22.45	20.2 0
TA-EF-20	E FAN	15	HP	27	480	3	0.9	22.45	20.2 0	1	22.45	20.2 0
TA-EF-21	E FAN	15	HP	27	480	3	0.9	22.45	20.2 0	1	22.45	20.2 0
TA-EF-22	E FAN	15	HP	27	480	3	0.9	22.45	20.2 0	1	22.45	20.2 0
TA-EF-23	E FAN	0.16 7	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
TA-EF-24	E FAN	0.5	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
TA-EF-25	E FAN	0.12 5	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
TA-EF-26	E FAN	0.12 5	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
TA-EF-27	E FAN	0.25	HP	5.8	120	1	0.9	0.70	0.63	1	0.70	0.63
TA-EF-28	E FAN	0.33	HP	7.2	120	1	0.9	0.86	0.78	1	0.86	0.78
TA-SF-1	S FAN	30	HP	51	480	3	0.9	42.40	38.1 6	1	42.40	38.1 6
TA-SF-2	S FAN	30	HP	51	480	3	0.9	42.40	38.1 6	1	42.40	38.1 6
TA-SF-3	S FAN	0.75	HP	13. 8	120	1	0.9	1.66	1.49	1	1.66	1.49
TA-SF-4	S FAN	0.5	HP	9.8	120	1	0.9	1.18	1.06	1	1.18	1.06
TA-SF-5	S FAN	0.5	HP	9.8	120	1	0.9	1.18	1.06	1	1.18	1.06

Tech 2: Towson Arena

PLUMBING EQUIPMENT TABLE												
Load				Characteristics								
Tag	Desc.	Mag.	Units	NEC	Volt.	Phase(s)	P.F.	kVA	kW	No.	kVA	kW
P-1	PUMP	25	HP	43	480	3	0.9	35.75	32.17	1	35.75	32.17
P-2	PUMP	25	HP	43	480	3	0.9	35.75	32.17	1	35.75	32.17
P-3	PUMP	7.5	HP	13.6	480	3	0.9	11.31	10.18	1	11.31	10.18
P-4	PUMP	7.5	HP	13.6	480	3	0.9	11.31	10.18	1	11.31	10.18
P-5	PUMP	7.5	HP	13.6	480	3	0.9	11.31	10.18	1	11.31	10.18
P-6	PUMP	30	HP	51	480	3	0.9	42.40	38.16	1	42.40	38.16
P-7	PUMP	30	HP	51	480	3	0.9	42.40	38.16	1	42.40	38.16
P-8	PUMP	30	HP	51	480	3	0.9	42.40	38.16	1	42.40	38.16
P-9	PUMP	30	HP	51	480	3	0.9	42.40	38.16	1	42.40	38.16
P-10	PUMP	N/A	HP	N/A	N/A	N/A	0.9	N/A	N/A	1	N/A	N/A
P-11	PUMP	15	HP	27	480	3	0.9	22.45	20.20	1	22.45	20.20
P-12	PUMP	15	HP	27	480	3	0.9	22.45	20.20	1	22.45	20.20
P-13	PUMP	15	HP	27	480	3	0.9	22.45	20.20	1	22.45	20.20
P-14	PUMP	30	HP	51	480	3	0.9	42.40	38.16	1	42.40	38.16
P-15	PUMP	30	HP	51	480	3	0.9	42.40	38.16	1	42.40	38.16
P-16	PUMP	30	HP	51	480	3	0.9	42.40	38.16	1	42.40	38.16
P-17	PUMP	0.5	HP	9.8	120	1	0.9	1.18	1.06	1	1.18	1.06
P-18	PUMP	0.5	HP	9.8	120	1	0.9	1.18	1.06	1	1.18	1.06
P-19	PUMP	0.33	HP	7.2	120	1	0.9	0.86	0.78	1	0.86	0.78
P-20	PUMP	0.25	HP	5.8	120	1	0.9	0.70	0.63	1	0.70	0.63
P-21	PUMP	0.25	HP	5.8	120	1	0.9	0.70	0.63	1	0.70	0.63
P-22	PUMP	0.33	HP	7.2	120	1	0.9	0.86	0.78	1	0.86	0.78
P-23	PUMP	0.33	HP	7.2	120	1	0.9	0.86	0.78	1	0.86	0.78
P-24	PUMP	2	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
P-25	PUMP	2	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A

Tech 2: Towson Arena

P-26	PUMP	0.25	HP	5.8	120	1	0.9	0.70	0.63	1	0.70	0.63
P-27	PUMP	0.25	HP	5.8	120	1	0.9	0.70	0.63	1	0.70	0.63
P-28	PUMP	0.33	HP	7.2	120	1	0.9	0.86	0.78	1	0.86	0.78
P-29	PUMP	0.33	HP	7.2	120	1	0.9	0.86	0.78	1	0.86	0.78
P-30	PUMP	0.33	HP	7.2	120	1	0.9	0.86	0.78	1	0.86	0.78
P-31	PUMP	0.33	HP	7.2	120	1	0.9	0.86	0.78	1	0.86	0.78
P-32	PUMP	0.5	HP	9.8	120	1	0.9	1.18	1.06	1	1.18	1.06
P-33	PUMP	0.5	HP	9.8	120	1	0.9	1.18	1.06	1	1.18	1.06
P-34	PUMP	0.33	HP	7.2	120	1	0.9	0.86	0.78	1	0.86	0.78
P-35	PUMP	0.5	HP	9.8	120	1	0.9	1.18	1.06	1	1.18	1.06
P-36	PUMP	1	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
P-37	PUMP	1	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
P-38	PUMP	0.03	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A

Tech 2: Towson Arena

UNIT HEATER EQUIPMENT TABLE												
Load				Characteristics								
Tag	Desc.	Mag.	Units	NEC	Volt.	Phase(s)	P.F.	kVA	kW	No.	kVA	kW
CUH-TA-1	HTR	0.1	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
CUH-TA-2	HTR	0.1	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
CUH-TA-3	HTR	0.1	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
CUH-TA-4	HTR	0.1	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
CUH-TA-5	HTR	0.1	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
CUH-TA-6	HTR	0.1	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
PUH-TA-1	HTR	0.05	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
PUH-TA-2	HTR	0.05	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
PUH-TA-3	HTR	0.05	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
PUH-TA-4	HTR	0.05	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
PUH-TA-5	HTR	0.05	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
PUH-TA-6	HTR	0.05	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
PUH-TA-7	HTR	0.05	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
PUH-TA-8	HTR	0.05	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
PUH-TA-9	HTR	0.05	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
PUH-TA-10	HTR	0.05	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
PUH-TA-11	HTR	0.05	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A

Tech 2: Towson Arena

DUCTLESS SPLIT SYSTEM UNIT EQUIPMENT TABLE												
Load				Characteristics								
Tag	Desc.	Mag.	Units	NEC	Volt.	Phase(s)	P.F.	kVA	kW	No.	kVA	kW
DSS-TA-1	INDOOR	N/A	HP	N/A	208	1	0.9	N/A	N/A	1	N/A	N/A
DSS-TA-2	INDOOR	N/A	HP	N/A	208	1	0.9	N/A	N/A	1	N/A	N/A
DSS-TA-3	INDOOR	N/A	HP	N/A	208	1	0.9	N/A	N/A	1	N/A	N/A
DSS-TA-4	INDOOR	N/A	HP	N/A	208	1	0.9	N/A	N/A	1	N/A	N/A
DSS-TA-5	INDOOR	N/A	HP	N/A	208	1	0.9	N/A	N/A	1	N/A	N/A
DSS-TA-1	OUTDOOR	N/A	HP	N/A	208	1	0.9	N/A	N/A	1	N/A	N/A
DSS-TA-2	OUTDOOR	N/A	HP	N/A	208	1	0.9	N/A	N/A	1	N/A	N/A
DSS-TA-3	OUTDOOR	N/A	HP	N/A	208	1	0.9	N/A	N/A	1	N/A	N/A
DSS-TA-4	OUTDOOR	N/A	HP	N/A	208	1	0.9	N/A	N/A	1	N/A	N/A
DSS-TA-5	OUTDOOR	N/A	HP	N/A	208	1	0.9	N/A	N/A	1	N/A	N/A

MISCELLANEOUS PLUMBING EQUIPMENT TABLE												
Load				Characteristics								
Tag	Desc.	Mag.	Units	NEC	Volt.	Phase(s)	P.F.	kVA	kW	No.	kVA	kW
DWH	TEMPORARY	0.5	HP	9.8	120	1	0.9	1.18	1.06	1	1.18	1.06
DWH-1	DOMESTIC	0.5	HP	9.8	120	1	0.9	1.18	1.06	1	1.18	1.06
DWH-2	DOMESTIC	0.5	HP	9.8	120	1	0.9	1.18	1.06	1	1.18	1.06
SP-1	SUMP PUMP	0.5	HP	9.8	115	1	0.9	1.13	1.01	1	1.13	1.01
SP-2	SUMP PUMP	0.5	HP	9.8	115	1	0.9	1.13	1.01	1	1.13	1.01
SP-3	SUMP PUMP	0.5	HP	9.8	115	1	0.9	1.13	1.01	1	1.13	1.01
WP-1	WASTE PUMP	1	HP	4.7	208	3	0.9	1.69	1.52	1	1.69	1.52
WP-2	WASTE PUMP	0.75	HP	13.8	115	1	0.9	1.59	1.43	1	1.59	1.43
WP-3	WASTE PUMP	0.75	HP	13.8	115	1	0.9	1.59	1.43	1	1.59	1.43

Tech 2: Towson Arena

MISCELLANEOUS MECHANICAL EQUIPMENT TABLE												
Load				Characteristics								
Tag	Desc.	Ma g.	Unit s	NE C	Vol t.	Phase(s)	P.F .	kVA	kW	No .	kVA	kW
BOILER-1	BOILER	300	HP	N/A	N/A	N/A	0.9	N/A	N/A	1	N/A	N/A
BOILER-2	BOILER	300	HP	N/A	N/A	N/A	0.9	N/A	N/A	1	N/A	N/A
BOILER-1 FAN	CONTROL	1	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
BOILER-2 FAN	CONTROL	1	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
CHILLER-1	CHILLER	400	TON	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
CHILLER-2	CHILLER	400	TON	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
COOLING TOWER	SINGLE CELL	25	HP	43	480	3	0.9	35.75	32.17	1	35.75	32.17
CONDENSER-1	WATER FILTER	5	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
CONDENSER-2	WATER FILTER	5	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
AIR CURTAIN-1	HEAT COIL	(2) 1	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
AIR CURTAIN-2	HEAT COIL	(2) 1	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
COMB./VENT.	SUPPLY AIR	0.7 5	HP	N/A	480	3	0.9	N/A	N/A	1	N/A	N/A
HUMIDIFIER	AHU-8 & 9	N/A	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A

FAN COIL UNIT EQUIPMENT TABLE												
Load				Characteristics								
Tag	Desc.	Mag.	Units	NEC	Volt.	Phase(s)	P.F.	kVA	kW	No.	kVA	kW
FCU-1	FAN COIL	(2) 1/12	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A
FCU-2	FAN COIL	(2) 1/12	HP	N/A	120	1	0.9	N/A	N/A	1	N/A	N/A

Tech 2: Towson Arena

Service Entrance Size:

Service entrance calculations were performed for the conceptual, design development and construction documents phases of construction.

Service Entrance Size Method A					
Conceptual/Schematic Phases					
Voltage	Building sqft	Building Type	VA/sqft	VA	Amps
480	120000	Arena	15	1800000	2165.064

Service Entrance Size Method B									
Design Development Phase									
Load Type	VA/sqft	KW/UNIT	NO.	PF	Building sqft	DEMAND F.	VA	Volt	Amps
LTG-Auditorium	1			0.9	120000	1	120000	480	144.34
RCPT	0.5			0.9	120000	.5*<10KV A	35000	480	42.10
EXHAUST FANS	2			0.9	120000	1	240000	480	288.68
COOLING	8			0.9	120000	1	960000	480	1154.70
ELEC. WTR HTR		60	3	0.9	120000	1	200	480	0.24
ELEVATORS		50	2	0.9	120000	1	111.111	480	0.13
Total							1355311		1630.19

Tech 2: Towson Arena

Service Entrance Size Method C			
Construction Documents Phases			
LOAD TYPE	KVA	DEM. F	A
LTG	97.50	1.00	57.55
RCPT	317.70	.5*()>10KVA	628.15
MECH	2924.30	1.00	1380.67
E PANEL	1464.90	1.00	739.57
LTG PANEL	534.40	1.00	101.22
ELEVATOR	40.10	1.00	57.07
ELEC. EQU.	1126.70	1.00	71.10
MISC EQUI.	549.80	1.00	1066.96
Total	7055.40		4102.29

Comparison of Tables			
Phase	Load - kVA	Voltage System	Load - Amps
Conceptual/Schematic Design	1800	480/208	2165
Design Development	1355	480/208	1630
Working Drawings	7055	480/208	4102
Service Entrance	Size - Amps	Voltage System	Capacity - kVA
Service Entrance 1	N/A	480 & 208	15 kV

Environmental Stewardship Design:

The Towson Arena is attempting to obtain a LEED silver status. Materials within 500 miles are sought after, and recycled content is a priority during construction. Low-emitting materials are also monitored by LEED.

Design Issues:

Early design issues involved AIC ratings. Multiple transformers and panelboards had incorrect AIC ratings during the bid submission. A copy of the addendum drawings shows the numerous fixes that were made.

Tech 2: Towson Arena

Single-Line Diagram Drawing List:

A single-line diagram is not included in the bid documents. A one-line is included on drawing E6.00, and a riser diagram is shown on E6.01. Please see the 11"x 17" and 30"x 42" copies of the existing riser diagram and my single-line diagram.

Communication Systems:

The bid documents include a list of IT drawings that were done by a separate IT consultant. The Towson Arena will have voice, data, surveillance, cable, intercom and card reader communication systems. Voice and data is spread out throughout the arena where needed. Surveillance cameras are positioned around the arena. Cable communication systems are of primary importance in the production and press room. Card readers are located at entrances to rooms that are no desired for public use.

Appendix A:

HID Lamp/Ballast Catalog Cuts:

A5: (1) medium base par30 lamp with magnetic ballast

CMH® PAR																													
PAR20	E26	O	U	20	3.60	29485	CMH20PAR20/SP	C156/ M156	15	13000	12000	1000	3000	81	8 Spotlight, UV Control	33,39.51	107												
																		29486	CMH20PAR20/FL	C156/ M156	15	3750	12000	1000	3000	81	25 Floodlight, UV Control	33,39.51	107
PAR30L	E26	O	U	20	4.75	29487	CMH20PAR30/SP10	C156/ M156	6	19800	12000	1200	3000	81	10 Spotlight, UV Control	33,39.51	107												
																		29488	CMH20PAR30/SP15	C156/ M156	6	14500	12000	1200	3000	81	15 Spotlight, UV Control	33,39.51	107
																		29489	CMH20PAR30/FL25	C156/ M156	6	4900	12000	1200	3000	81	25 Floodlight, UV Control	33,39.51	107
PAR20	E26	O	U	39	3.60	42068	CMH39UPAR20FL25	C130/ M130	15	7500	10000	2100	3000	86	25 Floodlight, UV Control	33,39.45	107												
																		42069	CMH39UPAR20SP10	C130/ M130	15	22000	10000	2100	3000	86	10 Spotlight, UV Control	33,39.45	107
																		96526	CMH39PAR20/NSP4K	C130/ M130	15	19450	10000	1950	4200	90	10 Spotlight, UV Control	33,39.45	107
																		96527	CMH39PAR20/FL4K	C130/ M130	15	6950	10000	1950	4200	90	25 Floodlight, UV Control	33,39.45	107
PAR30L	E26	O	U	39	4.75	42066	CMH39PAR30L/SP15	C130/ M130	6	29000	10000	2400	3000	81	15 Spotlight, UV Control	33,39.45	107												
																		42067	CMH39PAR30L/FL25	C130/ M130	6	11000	10000	2400	3000	81	25 Floodlight, UV Control	33,39.45	107
																		45066	CMH39PAR30L/SP10	C130/ M130	6	39600	10000	2400	3000	81	10 Spotlight, UV Control	33,39.45	107
																		96528	CMH39PAR30L/NSP4K	C130/ M130	6	36700	10000	2225	4200	89	10 Spotlight, UV Control	33,39.45	107
																		96529	CMH39PAR30L/SP4K	C130/ M130	6	26900	10000	2225	4200	89	15 Spotlight, UV Control	33,39.45	107
																		96530	CMH39PAR30L/FL4K	C130/ M130	6	10200	10000	2225	4200	89	25 Floodlight, UV Control	33,39.45	107
																		22152	CMH70PAR30L830SP	C139/ M98	6	43000	13000	4700	3000	82	15 Spotlight, UV Control	33,39.45	107
																		22159	CMH70PAR30L830FL	C139/ M98	6	10000	13000	4700	3000	82	40 Floodlight, UV Control	33,39.45	107

86847 – GEM70MLTLC3D-5

Metal Halide

1 – 70W MH M98 or M143 Quad (120/208/240/277V)

General characteristics	
Ballast Type	Magnetic – Core and Coil
ANSI Lamp Codes	M98 or M143
Voltage	120/208/240/277
Line Voltage Regulation (+/-)	5%
Circuit Type	HX-HPF
Insulation Class	180C
Type of Capacitor	Dry Film
Capacitance	8 MFD GECAP-8(280V-D)
Voltage (MIN)	280
Capacitor Temperature Rating	100°C (212°F)
GE lamiter	MH350-1A
Sound Rating	
Additional Info	

Electrical characteristics	
Supply Current Frequency	60 Hz

Order information		
Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage				
Lamp	Specifications by line voltage			
M98, M143	120	208	240	277
70W Ceramic Metal Halide	System Wattage (W)	88	88	88
	Nominal Current	0.90 A	0.50 A	0.40 A
	Ballast Factor	1	1	1
	Ballast Efficiency Factor	0.80	0.80	0.80
70W Quartz Metal Halide	Max Input Current	1.51 A	0.88 A	0.75 A
	Starting Current	0.96 A	0.59 A	0.49 A
	Open Circuit Voltage	257V	257V	257V
	Drop Out Voltage	96V	166V	192V
	Power Factor (%)	90	90	90
	Min. Starting Temp (°F/°C)	-22 / -30	-22 / -30	-22 / -30
	Fuse Rating	A	3	5
	UL Bench Top Rise	A	A	A

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coded leads, a properly rated capacitor and ignitor (if required) and all other components required for ballast replacement
- Quad ballast (120, 208, 240, 277)

Dimensions	
Length (in)	5.25 in (133 mm)
Width (in)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (in)	4.6 in (117 mm)
Mount Width (in or F)	
Mount Slots (MS)	0.25 in (6 mm)
A	2.0
B	3.0
Weight	5.00 lbs
Exit Type	Slide
Nominal Length	2.7 in (69 mm)
Frame Size (H x L)	2.613 in x 3.939 in

Wiring diagram HID W-IH-86824-86847 - see example on page 18-63
Case dimensions - Ref Drawing PC1 - see page 18-66

Safety and performance cUL Listed UL Listed

Tech 2: Towson Arena

A5E: (1) medium base MH par30 lamp, arc maintenance device and magnetic ballast

CMH® PAR																	
PAR20	E26	O	U	20	3.60	29485	CMH20PAR20/SP	C156/ M156	15	13000	12000	1000	3000	81	8 Spotlight, UV Control	33,39.51	107
		O	U	20	3.60	29486	CMH20PAR20/FL	C156/ M156	15	3750	12000	1000	3000	81	25 Floodlight, UV Control	33,39.51	107
PAR30L	E26	O	U	20	4.75	29487	CMH20PAR30/SP10	C156/ M156	6	19800	12000	1200	3000	81	10 Spotlight, UV Control	33,39.51	107
		O	U	20	4.75	29488	CMH20PAR30/SP15	C156/ M156	6	14500	12000	1200	3000	81	15 Spotlight, UV Control	33,39.51	107
		O	U	20	4.75	29489	CMH20PAR30/FL25	C156/ M156	6	4900	12000	1200	3000	81	25 Floodlight, UV Control	33,39.51	107
PAR20	E26	O	U	39	3.60	42068	CMH39UPAR20FL25	C130/ M130	15	7500	10000	2100	3000	86	25 Floodlight, UV Control	33,39.45	107
		O	U	39	3.60	42069	CMH39UPAR20SP10	C130/ M130	15	22000	10000	2100	3000	86	10 Spotlight, UV Control	33,39.45	107
		O	U	39	3.60	96526	CMH39PAR20/NSP4K	C130/ M130	15	19450	10000	1950	4200	90	10 Spotlight, UV Control	33,39.45	107
		O	U	39	3.60	96527	CMH39PAR20/FL4K	C130/ M130	15	6950	10000	1950	4200	90	25 Floodlight, UV Control	33,39.45	107
PAR30L	E26	O	U	39	4.75	42066	CMH39PAR30/SP15	C130/ M130	6	29000	10000	2400	3000	81	15 Spotlight, UV Control	33,39.45	107
		O	U	39	4.75	42067	CMH39PAR30/FL25	C130/ M130	6	11000	10000	2400	3000	81	25 Floodlight, UV Control	33,39.45	107
		O	U	39	4.75	45066	CMH39/PAR30LSP10	C130/ M130	6	39600	10000	2400	3000	81	10 Spotlight, UV Control	33,39.45	107
		O	U	39	4.75	96528	CMH39PAR30LNSP4K	C130/ M130	6	36700	10000	2225	4200	89	10 Spotlight, UV Control	33,39.45	107
		O	U	39	4.75	96529	CMH39PAR30LSP4K	C130/ M130	6	26900	10000	2225	4200	89	15 Spotlight, UV Control	33,39.45	107
		O	U	39	4.75	96530	CMH39PAR30LFL4K	C130/ M130	6	10200	10000	2225	4200	89	25 Floodlight, UV Control	33,39.45	107
		O	U	70	4.75	22152	CMH70PAR30L830SP	C139/ M98	6	43000	13000	4700	3000	82	15 Spotlight, UV Control	33,39.45	107
		O	U	70	4.75	22159	CMH70PAR30L830FL	C139/ M98	6	10000	13000	4700	3000	82	40 Floodlight, UV Control	33,39.45	107

86847 – GEM70MLTLC3D-5

Metal Halide

1 – 70W MH M98 or M143 Quad (120/208/240/277V)

General characteristics	
Ballast Type	Magnetic – Core and Coil
ANSI Lamp Codes	M98 or M143
Voltage	120/208/240/277
Line Voltage Regulation (+/-)	5%
Circuit Type	HX-HPF
Insulation Class	180C
Type of Capacitor	Dry film
Capacitance	8 Mfd. GFCAP-8/280V-D
Voltage (MIN)	280
Capacitor Temperature Rating	100°C (212°F)
GE Igniter	MH350-1A
Sound Rating	
Additional Info	


Electrical characteristics	
Supply Current Frequency	60 Hz

Order information		
Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage				
Lamp	Specifications by line voltage			
	120	208	240	277
M98, M143				
70W Ceramic Metal Halide	System Wattage (W)	88	88	88
	Nominal Current	0.90 A	0.50 A	0.40 A
	Ballast Factor	1	1	1
	Ballast Efficiency Factor	0.80	0.80	0.80
	Max Input Current	1.51 A	0.88 A	0.75 A
	Starting Current	0.96 A	0.59 A	0.49 A
	Open Circuit Voltage	257V	257V	257V
	Drop Out Voltage	96V	166V	192V
	Power Factor (≥)%	90	90	90
	Min. Starting Temp (°F/°C)	-22 / -30	-22 / -30	-22 / -30
	Fuse Rating	4	3	3
	UL Bench Top Rise	A	A	A

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coded leads, a properly rated capacitor and igniter (if required) and all other components required for ballast replacement
- Quad ballast (120, 208, 240, 277)

Dimensions	
Wiring diagram HID-W-(H)-86824-86847 – see example on page 18-63	
Case dimensions – Ref Drawing PC1 – see page 18-66	
Length (L)	5.25 in (133 mm)
Width (W)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (M)	4.6 in (117 mm)
Mount Width (X or F)	
Mount Slots (MS)	0.25 in (6 mm)
A	2.0
B	3.0
Weight	5.00 lbs
Exit Type	Side
Nominal Length	2.7 in (69 mm)
Frame Size (H x L)	2.813 in x 3.939 in

Safety and performance cUL Listed  UL Listed

Tech 2: Towson Arena

H1: (1) surface mounted metal halide upright t6 lamp with magnetic ballast

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Page Updated 09 / 2010

Bulb Shape	Base	LET	OP	Watts	MOL (in)	LCL (in)	Order Code	Description	ANSI Ballast Type	Case Qty	CCBP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp K	CRI	Additional Information	Reduced Watts/High Color Rendering	Footnotes	Warning and Caution Notices
Constant Color CMH® Metal Halide Lamps (continued)																				
CMH® Elliptical Open-Rated (continued)																				
ED17	E26	O	U	150	5.43	3.37	31065	CMH150U830MED/VO	C102/ M1A2	6		12000	12900	9500	3000	80	Clear		33	106
				150	5.43	3.37	31066	CMH150CU830MED/VO	C102/ M1A2	6		12000	11900	8800	3000	80	Coated		33	106
				150	5.43	3.37	31067	CMH150U942MED/VO	C102/ M1A2	6		15000	12000	9000	4200	90	Clear		33	106
				150	5.43	3.37	31068	CMH150CU942MED/VO	C102/ M1A2	6		15000	11000	8300	4200	90	Coated		33	106
CMH® Single-Ended G12 ULTRA																				
T6	G12	E	U	70	3.56	2.18	73056	CMH70U930G12ULR	C139/ M139	12		15000	6400	5600	3000	87	UV Control		33,39,45	104
CMH® Single-Ended G12																				
T4.5	G12	E	U	20	3.56	2.18	29703	CMH20TU/830G12	C156/ M156	12		12000	1650	1090	3000	81	UV Control		33,39,51	104
				39	3.56	2.18	20153	CMH39TU/CU830G12	C130/ M130	12		16500	3400	2300	3000	84	UV Control		33,39,45, 53	104
				39	3.56	2.18	29696	CMH39TU/942G12	C130/ M130	12		18000	3200	2600	4000	88	UV Control		33,39,45, 53	104
T6	G12	E	U	70	3.56	2.18	20016	CMH70TU/830G12	C139/ M139	12		15000	6200	4700	3000	83	UV Control		33,39,45	104
				70	3.56	2.18	20023	CMH70TU/942G12	C139/ M139	12		15000	6300	4700	4200	91	UV Control		33,39,45	104
				150	3.93	2.18	20017	CMH150TU/830G12	C142/ M102	12		12000	14000	11000	3000	82	UV Control		33,39,45	104
				150	3.93	2.18	20018	CMH150TU/942G12	C142/ M102	12		12000	13000	11000	4200	94	UV Control		33,39,45	104
CMH® Double-Ended TD																				

86718 - GEM150MLTLC3D-5

Metal Halide

1 - 150W MH M102 or M142 Quad [120/208/240/277V]

General characteristics

Ballast Type	Magnetic - Core and Coil
ANSI Lamp Codes	M142, M102
Voltage	120/208/240/277
Line Voltage Regulation (+/-)	5%
Circuit Type	HX-HPF
Insulation Class	F80C
Type of Capacitor	Box film
Capacitance	16 Mfd. GECAP-16/280V-D
Voltage (MIN)	300
Capacitor Temperature Rating	100°C (212°F)
GE Igniter	MH350-1A
Sound Rating	
Additional Info	

Electrical characteristics


Supply Current Frequency	60 Hz
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Order information

Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage

Lamp	Specifications by line voltage				
		120	208	240	277
M142, M102	System Wattage (W)	186	186	186	186
	Nominal Current	1.60 A	1.00A	0.80 A	0.70 A
Ceramic	Ballast Factor	1	1	1	1
	Ballast Efficiency Factor	0.81	0.81	0.81	0.81
150W	Max Input Current	3.37 A	1.95 A	1.68 A	1.39 A
	Starting Current	1.86 A	1.03 A	0.89 A	0.77 A
Quartz	Open Circuit Voltage	257V	257V	257V	257V
	Drop Out Voltage	96V	166V	192V	222V
Metal Halide	Power Factor (s=1%)	90	90	90	90
	Min. Start-up Temp (°F/°C)	-22/-30	-22/-30	-22/-30	-22/-30
	Eye Rating	4	5	4	4
	UL Bench Top Rise	A	B	A	A

Safety and performance cUL Listed  UL Listed

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coded leads, a properly rated capacitor and ignitor (if required) and all other components required for ballast replacement
- Quad ballast (120, 208, 240, 277)

Dimensions

Wiring diagram HID W-IH-86675-86718 - see example on page 18-63	
Case dimensions - Ref Drawing PCI - see page 18-66	
Length (L)	5.25 in (133 mm)
Width (W)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (M)	4.6 in (117 mm)
Mount Width (K or F)	0.25 in (6 mm)
Mount Slots (MS)	2.3
A	4.0
B	7.00 lbs
Weight	7.00 lbs
Exit Type	Side
Nominal Length	2.7 in (69 mm)
Frame Size (H x L)	2.813 in x 3.939 in

Tech 2: Towson Arena

H5: (1) 150W quartz metal halide flood light with magnetic ballast

High Intensity Discharge Lamps

Page Updated 09 / 2010

Bulb Shape	Base	LET	OP	Watts	MOL (in)	LCL (in)	Order Code	Description	ANSI Ballast Type	Case Qty	CBCP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp K	CRI	Additional Information	Reduced Watts/High Color Rendering	Footnotes	Warning and Caution Notices
PulseArc® Multi-Vapor® Metal Halide Lamps																				
50 Watts																				
BD17	E26	E	U	50	5.43	3.43	10361	MKR50/U/MED	M110	6		10000	3200	2100	3700	60	Clear			118
		E	U	50	5.43	3.43	10364	MKR50/C/U/MED	M110	6		10000	3000	2000	3400	65	Coated			118
70 Watts																				
BD17	E26	E	U	70	5.43	3.43	22158	MKR70/U/MED	M98	6		12000	5500	3500	3200	70	Clear			118
		E	U	70	5.43	3.43	22162	MKR70/C/U/MED	M98	6		12000	5300	3300	3200	70	Coated			118
		E	U	70	5.43	3.43	12590	MVR70/U/MED	M98	6		12000	4700	3000	4000	70	Clear			118
		E	U	70	5.43	3.43	12594	MVR70/C/U/MED	M98	6		12000	4500	2800	4000	70	Coated			118
100 Watts																				
BD17	E26	E	U	100	5.43	3.43	18680	MKR100/U/MED	M90	6		15000	9000	6200	3200	70	Clear			118
		E	U	100	5.43	3.43	18679	MKR100/C/U/MED	M90	6		15000	8500	5900	3200	70	Coated			118
		E	U	100	5.43	3.43	12652	MVR100/U/MED	M90	6		15000	8100	5800	4000	70	Clear			118
		E	U	100	5.43	3.43	12653	MVR100/C/U/MED	M90	6		15000	7600	4900	4000	70	Coated			118
150 Watts																				
BD17	E26	E	U	150	5.43	3.43	22935	MKR150/U/MED	M102	6		15000	13300	10000	3400	60	Clear			118
		E	U	150	5.43	3.43	22936	MKR150/C/U/MED	M102	6		15000	12600	9500	3100	60	Coated			118
		E	U	150	5.43	3.43	12598	MVR150/U/MED	M102	6		15000	14000	10500	4300	65	Clear			118
		E	U	150	5.43	3.43	12604	MVR150/C/U/MED	M102	6		15000	13300	10000	3900	70	Coated			118
175 Watts																				

86718 – GEM150MLTLC3D-5

Metal Halide

1 – 150W MH M102 or M142 Quad (120/208/240/277V)

General characteristics

Ballast Type	Magnetic – Core and Coil
ANSI Lamp Codes	M142, M102
Voltage	120/208/240/277
Line Voltage Regulation (+/-)	5%
Circuit Type	HX-HPF
Insulation Class	180C
Type of Capacitor	Dry film
Capacitance	16 Mfd GE CAP-16/280V-D
Voltage (MMV)	300
Capacitor Temperature Rating	100°C (212°F)
GE Igniter	MH350-1A
Sound Rating	
Additional Info	

Electrical characteristics

Supply Current Frequency	60 Hz
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Order information

Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage

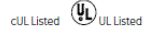
Lamp	Specifications by line voltage	120	208	240	277
M142, M102	System Voltage (V)	120	208	240	277
	Nominal Current	1.60 A	1.00 A	0.80 A	0.70 A
Ceramic Metal Halide	Ballast Factor	1	1	1	1
	Ballast Efficiency Factor	0.81	0.81	0.81	0.81
150W Quartz	Max Input Current	3.37 A	1.95 A	1.68 A	1.39 A
	Starting Current	1.86 A	1.03 A	0.89 A	0.77 A
Metal Halide	Open Circuit Voltage	257V	257V	257V	257V
	Drop Out Voltage	96V	166V	192V	222V
	Power Factor (≥9%)	90	90	90	90
	Min. Starting Temp (°F/°C)	-22 / -30	-22 / -30	-22 / -30	-22 / -30
	Fuse Rating	10	5	5	4
	UL Bench Top Rise	A	B	A	A

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coded leads, a properly rated capacitor and ignitor (if required) and all other components required for ballast replacement
- Quad ballast (120, 208, 240, 277)

Dimensions

Wiring diagram HID W-(H)-86675-86718 – see example on page 18-63	
Case dimensions – Ref Drawing PC1 – see page 18-66	
Length (L)	5.25 in (133 mm)
Width (W)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (M)	4.6 in (117 mm)
Mount Width (X or F)	0.25 in (6 mm)
Mount Slots (MS)	2.3
A	4.0
B	4.0
Weight	7.00 lbs
Exit Type	Side
Nominal Length	2.7 in (69 mm)
Frame Size (H x L)	2.813 in x 3.939 in

Safety and performance



Tech 2: Towson Arena

K1: (1) 39W t6 ceramic metal halide with magnetic ballast

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Page Updated 09 / 2010

Bulb Shape	Base	LET	OP	Watts	MOL (in)	LCL (in)	Order Code	Description	ANSI Ballast Type	Case Qty	CBCP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp K	CRI	Additional Information	Reduced Watts/High Color Rendering	Footnotes	Warning and Caution Notices
Constant Color CMH® Metal Halide Lamps (continued)																				
CMH® Elliptical Open-Rated (continued)																				
ED17	E26	O	U	150	5.43	3.37	31065	CMH150U830MED/O	C102/M142	6		12000	12900	9500	3000	80	Clear		33	106
				150	5.43	3.37	31066	CMH150CU830MED/O	C102/M142	6		12000	11900	8800	3000	80	Coated		33	106
				150	5.43	3.37	31067	CMH150U942MED/O	C102/M142	6		15000	12000	9000	4200	90	Clear		33	106
				150	5.43	3.37	31068	CMH150CU942MED/O	C102/M142	6		15000	11000	8300	4200	90	Coated		33	106
CMH® Single-Ended G12 ULTRA																				
T6	G12	E	U	70	3.56	2.18	73056	CMH70U930G12ULR	C139/M139	12		15000	6400	5600	3000	87	UV Control		33,39,45	104
CMH® Single-Ended G12																				
T4.5	G12	E	U	20	3.56	2.18	29703	CMH20T/U/830G12	C156/M156	12		12000	1650	1090	3000	81	UV Control		33,39,51	104
				39	3.56	2.18	20153	CMH39T/U/CU830G12	C130/M130	12		16500	3400	2300	3000	84	UV Control		33,39,45,53	104
				39	3.56	2.18	29696	CMH39T/U/942G12	C130/M130	12		18000	3200	2600	4000	88	UV Control		33,39,45,53	104
T6	G12	E	U	70	3.56	2.18	20016	CMH70T/U/830G12	C139/M139	12		15000	6200	4700	3000	83	UV Control		33,39,45	104
				70	3.56	2.18	20023	CMH70T/U/942G12	C139/M139	12		15000	6300	4700	4200	91	UV Control		33,39,45	104
				150	3.93	2.18	20017	CMH150T/U/830G12	C142/M102	12		12000	14000	11000	3000	82	UV Control		33,39,45	104
				150	3.93	2.18	20018	CMH150T/U/942G12	C142/M102	12		12000	13000	11000	4200	94	UV Control		33,39,45	104
CMH® Double-Ended TD																				
T6	Rx7s	E	H45	70	4.50	2.25	92587	CMH70TD/830RX7S	M85/M139	12		15000	7000	5600	3000	81	UV Control		33,39	109
				70	4.50	2.25	92588	CMH70TD/942RX7S	M85/M139	12		15000	7000	5600	4200	88	UV Control		33,39	109
T7	Rx7s	E	H45	150	5.37	2.62	92589	CMH150TD830RX7S	M81/M142	12		15000	14000	11500	3000	80	UV Control		33,39	109
				150	5.37	2.62	92590	CMH150TD942RX7S	M81/M142	12		15000	14000	11500	4200	93	UV Control		33,39	109
CMH® GU6.5																				
T4	GU6.5	E	U	20	2.05	1.18	85086	CMH20T/U830GU6.5	C156/M156	12		12000	1615	1066	3000	81	UV Control		33,39,51	104
				39	2.05	1.18	71484	CMH39T/U930GU6.5	C130/M130	12		10000	3400	2300	3000	88	UV Control		33,39,51	104
				39	2.05	1.18	71487	CMH39T/U942GU6.5	C130/M130	12		12000	3400	2600	4000	90	UV Control		33,39,51	104
CMH® Mini ULTRA																				
T4.5	G8.5	E	U	70	3.37	2.00	73057	CMH70U930G8.5ULR	C139/M139	12		15000	6200	5400	3000	88	UV Control		33,39,45	104
CMH® Mini's																				
T4.5	G8.5	E	U	20	3.37	2.00	92696	CMH20TCU830G8.5	C156/M156	12		12000	1650	1090	3000	81	UV Control		33,39,51	104
				39	3.37	2.00	90352	CMH39TCU830G8.5	C130/M130	12		16500	3400	2300	3000	84	UV Control		33,39,45,53	104
				39	3.37	2.00	29698	CMH39TCU942G8.5	C130/M130	12		18000	3200	2600	4000	88	UV Control		33,39,45,53	104

86824 – GEM50MLTLC3D-5

Metal Halide

1 – 50W MH M110 or M148 Quad (120/208/240/277V)

General characteristics	
Ballast Type	Magnetic – Core and Coil
ANSI Lamp Codes	M110 or M148
Voltage	120/208/240/277
Line Voltage Regulation (+/-)	5%
Circuit Type	HX-HPF
Insulation Class	180C
Type of Capacitor	Dry film
Capacitance	6 MFD GE CAP. 6/280V-D
Voltage (MIN)	280
Capacitor Temperature Rating	100°C (212°F)
GE lamiter	MH350-1A
Sound Rating	
Additional Info	

Electrical characteristics	
Supply Current Frequency	60 Hz

Order information		
Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage				
Lamp	Specifications by line voltage			
M110, M148 50W Quartz Metal Halide	120	208	240	277
System Wattage (W)	61	61	61	61
Nominal Current	0.60 A	0.30 A	0.30 A	0.20 A
Ballast Factor	1	1	1	1
Ballast Efficiency Factor	0.82	0.82	0.82	0.82
Max Input Current	1.16 A	0.61 A	0.58 A	0.30 A
Starting Current	0.61 A	0.34 A	0.30 A	0.26 A
Open Circuit Voltage	264V	264V	264V	264V
Drop Out Voltage	96V	166V	192V	222V
Power Factor (s=7%)	90	90	90	90
Min. Starting Temp (°F/°C)	-22 / -30	-22 / -30	-22 / -30	-22 / -30
Fuse Rating	3	3	2	2
UL Bench Top Rise	C	C	C	C

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coded leads, a properly rated capacitor and ignitor (if required) and all other components required for ballast replacement
- Quad ballast (120, 208, 240, 277)

Dimensions	
Wiring diagram HID W-IH-86824-86847 – see example on page 18-63	
Case dimensions – Ref Drawing PCL – see page 18-66	
Length (L)	5.25 in (133 mm)
Width (W)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (M)	4.6 in (117 mm)
Mount Width (X or F)	0.25 in (6 mm)
Mount Spots (MS)	1.0
A	1.0
B	2.0
Weight	3.40 lbs
Exit Type	Side
Nominal Length	2.2 in (69 mm)
Frame Size (H x L)	2.813 in x 3.939 in

Safety and performance cUL Listed UL Listed

S2: (1) 70W ceramic metal halide downlight with magnetic ballast

Page Updated 08 / 2010

High Intensity Discharge Lamps

Bulb Shape	Base	LET	OP	WTS	MOL (in)	LCL (in)	Order Code	Description	ANSI Ballast Type	Case Qty	CBCP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp K	CRI	Additional Information	Reduced Watts/ High Color Rendering	Footnotes	Warning and Caution Notices
Constant Color CMH® Metal Halide Lamps (continued)																				
CMH® PAR (continued)																				
PAR38	E26	O	U	70	5.31		45675	CMH70PAR38SPECCO	C9B/ M139/ M143/	6	40000	10000	4800		3000	82	15 Spotlight, UV Control		33.39	108
							45677	CMH70PAR38FL/ECCO	C9B/ M139/ M143/	6	14000	10000	4800		3000	82	25 Floodlight, UV Control		33.39	108
							45679	CMH70PAR38MF/ECCO	C9B/ M139/ M143/	6	4400	10000	4800		3000	82	60 Wide Floodlight, UV Control		33.39	108
							45680	CMH100PAR38SPECCO	C9Q/ M9Q/ M140	6	45000	10000	6500		3000	81	15 Spotlight, UV Control		33.39	108
							45681	CMH100PAR38FLECCO	C9Q/ M9Q/ M140	6	15000	10000	6500		3000	81	25 Floodlight, UV Control		33.39	108
							45682	CMH100PAR38MF/ECCO	C9Q/ M9Q/ M140	6	5500	10000	6500		3000	81	60 Wide Floodlight, UV Control		33.39	108
PAR64	GX16D	E	U	150	6.42		88537	CMH150PAR64 MFU/830	C102/ M142	6	47000	8000			4200	80	Medium Flood		33.39	108
							16963	CMH150PAR64 WFL/942	C102/ M142	6	16000	8000			4200	90	Wide Flood		33.39	108
							16962	CMH150PAR64 MFU/942	C102/ M142	6	47000	8000			4200	90	Medium Flood		33.39	108
							16961	CMH150PAR64 SPY/942	C102/ M142	6	154000	8000			4200	90	Spot		33.39	108
							16960	CMH150PAR64 WFL/830	C102/ M142	6	16000	8000			3000	80	Wide Flood		33.39	108
							16958	CMH150PAR64 SP/830	C102/ M142	6	154000	8000			3000	80	Spot		33.39	108
CMH® Elliptical																				
8017	E26	E	U	70	5.43	3.37	22119	CMH70U/830/MED	M139/ M9B/ C9B	6		15000	6300	4100	3000	80	Clear		33	116
							22124	CMH70U/2/830/MED	M139/ M9B/ C9B	6		15000	6000	4000	3000	80	Coated		33	116
							22127	CMH100U/830/MED	C9Q	6		10000V	9200	6600V	3000	83	Clear		33	116

Tech 2: Towson Arena

86847 – GEM70MLTLC3D-5

Metal Halide

1 – 70W MH M98 or M143 Quad (120/208/240/277V)

General characteristics	
Ballast Type	Magnetic – Core and Coil
ANSI Lamp Codes	M98 or M143
Voltage	120/208/240/277
Line Voltage Regulation (+/-)	5%
Circuit Type	HX, HFF
Insulation Class	180C
Type of Capacitor	Dry film
Capacitance	8 Min GE CAP-8/280V-D
Voltage Min	260
Capacitor Temperature Rating	100°C (212°F)
GE Igniter	MH350-1A
Sound Rating	
Additional Info	

Electrical characteristics	
Supply Current Frequency	60 Hz

Order information		
Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage				
Lamp	Specifications by line voltage			
M98, M143	120	208	240	277
70W Ceramic Metal Halide	88	88	88	88
	System Wattage (W)			
	0.90 A	0.50 A	0.40 A	0.40 A
	Nominal Current			
70W Quartz Metal Halide	1	1	1	1
	Ballast Factor			
	0.80	0.80	0.80	0.80
	Ballast Efficiency Factor			
	1.51 A	0.88 A	0.75 A	0.66 A
	Max Input Current			
	0.96 A	0.59 A	0.49 A	0.44 A
	Starting Current			
	25.7V	25.7V	25.7V	25.7V
	Open Circuit Voltage			
	36V	166V	107V	22.2V
	Drop Out Voltage			
	90	90	90	90
	Power Factor (%-90)			
	-22 / -30	-22 / -30	-22 / -30	-22 / -30
	Min. Starting Temp (°F/°C)			
	4	3	3	2
	Fuse Rating			
	A	A	A	A
	UL Bench Top Rise			

Safety and performance

cUL Listed UL Listed

Dimensions

Wiring diagram HID W-IHL-86824-86847 – see example on page 18-63

Case dimensions – Ref Drawing PC1 – see page 18-66

Length (L)	6.25 in (153 mm)
Width (W)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (M)	4.6 in (117 mm)
Mount Width (X or F)	
Mount Slots (MS)	0.25 in (6 mm)
A	2.0
B	3.0
Weight	5.00 lbs
Exit Type	Side
Nominal Length	2.7 m (69 mm)
Frame Size (H x L)	2.813 m x 3.939 m

S2E: (1) 70W ceramic metal halide downlight, arc maintenance device, magnetic ballast

High Intensity Discharge Lamps

Page Updated 08 / 2010

Bulb Shape	Base	LET	OP	Watts	MDL (in)	LCL (in)	Order Code	Description	ANSI Ballast Type	Case Qty	CBCP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp. K	CRI	Additional Information	Reduced Watts/ High Color Rendering	Footnotes	Warning and Caution Notices	
Constant Color CMH® Metal Halide Lamps (continued)																					
CMH® PAR (continued)																					
PAR38	E26	O	U	70	5.31		45675	CMH70PAR38F/E/ECO	C9Q/M139/M143V	6		40000	10000	4800	3000	82	15 Spotlight, UV Control		33,39	108	
				70	5.31		45677	CMH70PAR38F/E/ECO	C9Q/M139/M143V	6		14000	10000	4800	3000	82	25 Floodlight, UV Control		33,39	108	
				70	5.31		45679	CMH70PAR38W/E/ECO	C9Q/M139/M143V	6		4400	10000	4800	3000	82	60 Wide Floodlight, UV Control		33,39	108	
				100	5.31		45680	CMH100PAR38S/PE/ECO	C9Q/M90/M140	6		45000	10000	6500	3000	81	15 Spotlight, UV Control		33,39	108	
				100	5.31		45681	CMH100PAR38F/LE/ECO	C9Q/M90/M140	6		15000	10000	6500	3000	81	25 Floodlight, UV Control		33,39	108	
				100	5.31		45682	CMH100PAR38W/FE/ECO	C9Q/M90/M140	6		5500	10000	6500	3000	81	60 Wide Floodlight, UV Control		33,39	108	
PAR56	GX160	E	U	150	6.42		88537	CMH150PAR56W/MFL/830	C102/M142	6		47000	8000		3000	80	Medium Flood		33,39	108	
				150	6.42		16953	CMH150PAR56W/WFL/942	C102/M142	6		16000	8000		4200	90	Wide Flood		33,39	108	
				150	6.42		16962	CMH150PAR56W/MFL/942	C102/M142	6		47000	8000		4200	90	Medium Flood		33,39	108	
				150	6.42		16961	CMH150PAR56W/SP/942	C102/M142	6		154000	8000		4200	90	Spot		33,39	108	
				150	6.42		16960	CMH150PAR56W/WFL/830	C102/M142	6		16000	8000		3000	80	Wide Flood		33,39	108	
				150	6.42		16958	CMH150PAR56W/SP/830	C102/M142	6		154000	8000		3000	80	Spot		33,39	108	
CMH® Elliptical																					
BD17	E26	E	U	70	5.43	3.37	22119	CMH70U/830/MED	M139/M99/C98	6		15000	6300	4100	3000	80	Clear			33	116
				70	5.43	3.37	22124	CMH70U/830/MED	M139/M99/C98	6		15000	6000	4000	3000	80	Coated			33	116
				100	5.43	3.37	22127	CMH100U/830/MED	C9Q	6		10000V	9200	6600V	3000	83	Clear			33	116

86847 – GEM70MLTLC3D-5

Metal Halide

1 – 70W MH M98 or M143 Quad (120/208/240/277V)

General characteristics	
Ballast Type	Magnetic - Core and Coil
ANSI Lamp Codes	M98 or M143
Voltage	120/208/240/277
Line Voltage Regulation (+/-)	5%
Circuit Type	HX-HPF
Insulation Class	180C
Type of Capacitor	Dry film
Capacitance	8 Mfd GECA-P-8/280V-D
Voltage (MIN)	280
Capacitor Temperature Rating	100°C (212°F)
GE Igniter	MH350-1A
Sound Rating	
Additional Info	

Electrical characteristics	
Supply Current Frequency	60 Hz

Order information		
Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage					
Lamp	Specifications by line voltage	120	208	240	277
M98, M143	System Wattage (W)	88	88	88	88
70W Ceramic Metal Halide	Nominal Current	0.90A	0.50A	0.40A	0.40A
70W Quartz Metal Halide	Ballast Factor	1	1	1	1
	Ballast Efficiency Factor	0.80	0.80	0.80	0.80
	Max Input Current	1.51A	0.88A	0.75A	0.66A
	Starting Current	0.96A	0.59A	0.49A	0.44A
	Open Circuit Voltage	257V	257V	257V	257V
	Drop Out Voltage	96V	166V	192V	222V
	Power Factor (b=)%	90	90	90	90
	Min. Starting Temp (°F/°C)	-22 / -30	-22 / -30	-22 / -30	-22 / -30
	Fuse Rating	4	3	3	2
	UL Bench Top Rise	A	A	A	A

Dimensions


Wiring diagram HID-W-(H)-86824-86847 - see example on page 18-63

Case dimensions - Ref Drawing PC1 - see page 18-66

Length (L)	5.25 in (133 mm)
Width (W)	1.25 in (32 mm)

Mounting dimensions

Mount Length (M)	4.6 in (117 mm)
Mount Width (X or F)	
Mount Slots (MS)	0.25 in (6 mm)
A	2.0
B	3.0
Weight	5.00 lbs
Exit Type	Side
Nominal Length	2.7 in (69 mm)
Frame Size (H x L)	2.813 in x 3.939 in

Safety and performance cUL Listed  UL Listed

S4: (1) 1000W metal halide sports lighting lamp with magnetic ballast

87213 – GEM1000ML5AA5-5

Metal Halide

1 – 1000W MH M47 or H36 5-Tap (120/208/240/277/480V)

General characteristics	
Ballast Type	Magnetic - Core and Coil
ANSI Lamp Codes	M47, H36
Voltage	120/208/240/277/480
Line Voltage Regulation (+/-)	10%
Circuit Type	CWA
Insulation Class	180C
Type of Capacitor	Oil filled
Capacitance	24 Mfd GECA-P-24/480V-O
Voltage (MIN)	480
Capacitor Temperature Rating	100°C (212°F)
GE Igniter	
Sound Rating	
Additional Info	

Electrical characteristics	
Supply Current Frequency	60 Hz

Order information		
Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	2

Specifications by lamp and line voltage						
Lamp	Specifications by line voltage	120	208	240	277	480
M47, H36	System Wattage (W)	1,103	1,103	1,103	1,103	1,103
1000W Quartz Metal Halide	Nominal Current	9.30A	5.40A	4.70A	4.10A	2.40A
1000W Mercury	Ballast Factor	1	1	1	1	1
	Ballast Efficiency Factor	0.91	0.91	0.91	0.91	0.91
	Max Input Current	9.30A	5.40A	4.70A	4.10A	2.40A
	Starting Current	6.34A	3.71A	3.20A	2.79A	1.65A
	Open Circuit Voltage	445V	445V	445V	445V	445V
	Drop Out Voltage	96V	166V	192V	222V	384V
	Power Factor (b=)%	90	90	90	90	90
	Min. Starting Temp (°F/°C)	-22 / -30	-22 / -30	-22 / -30	-22 / -30	-22 / -30
	Fuse Rating	20	15	10	10	10
	UL Bench Top Rise	F	C	C	C	D

Dimensions

Wiring diagram HID-W-(K)-87212-87213 - see example on page 18-64

Case dimensions - Ref Drawing PC3 - see page 18-66


Length (L)	7.75 in (197 mm)
Width (W)	2.75 in (70 mm)

Mounting dimensions

Mount Length (M)	6.1 in (155 mm)
Mount Width (X or F)	
Mount Slots (MS)	0.25 in (6 mm)
A	3.0
B	5.0
Weight	21.00 lbs
Exit Type	Side
Nominal Length	3.7 in (95 mm)
Frame Size (H x L)	4.25 in x 6.00 in

Lead lengths

Orange
Violet and Black
Violet/White
Black/Yellow

Safety and performance cUL Listed  UL Listed

18-22 See page E-1 for warranty inform

Bulb Shape	Base	LET	OP	Watts	MDL (in)	LCL (in)	Order Code	Description	ANSI Ballast Type	Case Qty	CRCP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp K	CEI	Additional Information	Reduced Watt/ High Color Rendering	Footcandles	Warning and Caution Notices
PulseArc® Multi-Vapor® Metal Halide Lamps (continued)																				
E028	E39	E	VBU	400	8.25	5.00	46271	MVRA0QVBUED28PA	M135/ M155	12		20000	44000	28500	4000	65	Clear		43, 49	116
				400	8.25	5.00	46272	MVRA0QVBUED28PA	M135/ M155	12		20000	42000	27500	3700	70	Coated Compact		43, 49	116
				400	8.25	5.00	72885	MVRA0QHORV ED28PA	M135/ M155	12		20000	38000	21400	4100	65	Clear Compact		43, 49	117
750 Watts																				
BT37	E39	E	VBU	750	11.50	7.00	27219	MVRS0QVBU/PA	M149	6		16000	82000	60000	4000	65	Clear		49	117
				750	11.50	7.00	85560	MVRS0QVBU/PA	M149	6		16000	72000	54000	3700	70	Coated		49	117
1000 Watts																				
BT37	E39	E	U	1000	11.50	7.00	10389	MVRI000U/BT37/PA	M141	6		9000H/ 12000V	105000H/ 115000V	82000H/ 90000V	3900	65	Clear		43, 49	116
Multi-Vapor® Metal Halide Lamps																				
150 Watts																				
E028	E39	E	U	150	8.25	5.00	13461	MVRI50U/WM	M57/ M107	12		7500H/ 10000V	11500H/ 13500V	7200H/ 8800V	4000	65	Clear, Watt-Miser®	→		117
				150	8.25	5.00	13460	MVRI50U/WM	M57/ M107	12		7500H/ 10000V	10900H/ 12800V	6900H/ 8000V	3700	70	Coated, Watt-Miser®	→		117
175 Watts																				
B017	E26	E	U	175	5.75	3.43	18902	MVRI75U/MED	M57	6		6000H/ 10000V	11700H/ 13600V	7400H/ 8800V	4000	65	Clear			117
				175	5.75	3.43	26432	MVRI75U/MED/CP	M57	4		6000H/ 10000V	11700H/ 13600V	7400H/ 8800V	4000	65	Clear, Consumer Pack			117
				175	5.75	3.43	19976	MVRI75U/WMED	M57	6		6000H/ 10000V	11900H/ 12900V	7900H/ 8400V	3900	65	Coated			117
E028	E39	E	U	175	8.25	5.00	47760	MVRI75U	M57	12		6000H/ 10000V	11700H/ 13600V	7900H/ 8800V	4000	65	Clear			117
				175	8.25	5.00	26433	MVRI75U/CP	M57	4		6000H/ 10000V	11700H/ 13600V	7900H/ 8800V	4000	65	Clear, Consumer Pack			117
				175	8.25	5.00	47761	MVRI75U/QU	M57	12		6000H/ 10000V	11900H/ 12900V	7900H/ 8400V	3900	70	Coated			117
				175	8.25	5.00	17634	MVRI75/SP30/QU	M57	12		6000H/ 10000V	10300H/ 12000V	6500H/ 7600V	3000	70	REF-30 Phosphor Coating			117
PAR38	E26	E	U	175	5.62		25218	MVRI75/PAR38/FL1	M57	6	6500	7500	12000		3800	65	Clear, One-Piece PAR			117
250 Watts																				
E028	E39	E	U	250	8.25	5.00	42729	MVRI250U	M58	12		6000H/ 10000V	19100H/ 20800V	12400H/ 13500V	4200	65	Clear			117
				250	8.25	5.00	26434	MVRI250U/CP	M58	4		6000H/ 10000V	19100H/ 20800V	12400H/ 13500V	4200	65	Clear, Consumer Pack			117
				250	8.25	5.00	42731	MVRI250U/QU	M58	12		6000H/ 10000V	18200H/ 19800V	11800H/ 13000V	3900	70	Coated			117
				250	8.25	5.00	17633	MVRI250/SP30/QU	M58	12		6000H/ 10000V	16600H/ 18000V	10800H/ 11500V	3000	70	REF-30 Phosphor Coating			117
360 Watts																				
E037	E39	S	VBU	360	11.50	7.00	13495	MVRI360VBU/WM/HC	M59/ M165	6		20000	36000	23500	4300	65	Clear, Watt-Miser®	→	32, 49	121
400 Watts																				
E037	E39	S	U	400	11.50	7.00	43826	MVRA0QU	M59	6		15000H/ 20000V	33100H/ 36000V	22100H/ 23500V	4000	65	Clear		49	121
				400	11.50	7.00	26435	MVRA0QU/CP	M59	4		15000H/ 20000V	33100H/ 36000V	22700H/ 23500V	4000	65	Clear, Consumer Pack		49	121
				400	11.50	7.00	43829	MVRA0QU/QU	M59	6		15000H/ 20000V	32200H/ 35000V	19300H/ 23000V	3700	70	Coated		49	121
				400	11.50	7.00	17632	MVRA0QU/SP30/QU	M59	6		15000H/ 20000V	28500H/ 31000V	17100H/ 18600V	3000	70	REF-30 Phosphor Coating		49	121
E028	E39	E	U	400	8.25	5.00	18904	MVRA0QU/ED28	M59	12		15000H/ 20000V	33100H/ 36000V	22100H/ 23500V	4000	65	Clear, Compact		49	117
				400	8.25	5.00	19975	MVRA0QU/ED28	M59	12		15000H/ 20000V	32200H/ 35000V	19300H/ 23000V	4000	65	Coated, Compact		49	117
1000 Watts																				
BT56	E39	S	U	1000	15.37	9.50	41826	MVRI000QU	M47	6		11000H/ 15000V	100700H/ 108000V	79000H/ 86000V	4000	65	Clear		49	121
				1000	15.37	9.50	41827	MVRI000QU/QU	M47	6		11000H/ 15000V	96600H/ 105000V	73000H/ 80000V	3700	65	Coated		49	121
BT37	E39	E	U	1000	11.50	7.00	18205	MVRI000U/BT37	M47	6		9000H/ 12000V	105000H/ 115000V	82000H/ 90000V	3700	65	Clear, Compact		49	121

Tech 2: Towson Arena

FF: (1) 100W vertical site fixture metal halide lamp with 277V magnetic ballast

High Intensity Discharge Lamps															Page Updated 09 / 2010					
Bulb Shape	Base	LET	OP	Watts	MOL (in)	LCL (in)	Order Code	Description	ANSI Ballast Type	Case Qty	CBCP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp K	CRI	Additional Information	Reduced Watts/ High Color Rendering	Footnotes	Warning and Caution Notices
PulseArc® Multi-Vapor® Metal Halide Lamps																				
50 Watts																				
BD17	E26	E	U	50	5.43	3.43	10361	MXR50/U/MED	M110	6		10000	3200	2100	3700	60	Clear			118
		E	U	50	5.43	3.43	10364	MXR50/C/U/MED	M110	6		10000	3000	2000	3400	65	Coated			118
70 Watts																				
BD17	E26	E	U	70	5.43	3.43	22158	MXR70/U/MED	M98	6		12000	5500	3500	3200	70	Clear			118
		E	U	70	5.43	3.43	22162	MXR70/C/U/MED	M98	6		12000	5300	3300	3200	70	Coated			118
		E	U	70	5.43	3.43	12590	MVR70/U/MED	M98	6		12000	4700	3000	4000	70	Clear			118
		E	U	70	5.43	3.43	12594	MVR70/C/U/MED	M98	6		12000	4500	2800	4000	70	Coated			118
100 Watts																				
BD17	E26	E	U	100	5.43	3.43	18680	MXR100/U/MED	M90	6		15000	9000	6200	3200	70	Clear			118
		E	U	100	5.43	3.43	18679	MXR100/C/U/MED	M90	6		15000	8500	5900	3200	70	Coated			118
		E	U	100	5.43	3.43	12652	MVR100/U/MED	M90	6		15000	8100	5800	4000	70	Clear			118
		E	U	100	5.43	3.43	12653	MVR100/C/U/MED	M90	6		15000	7600	4900	4000	70	Coated			118
150 Watts																				
BD17	E26	E	U	150	5.43	3.43	22935	MXR150/U/MED	M102	6		15000	13300	10000	3400	60	Clear			118
		E	U	150	5.43	3.43	22936	MXR150/C/U/MED	M102	6		15000	12600	9500	3100	60	Coated			118
		E	U	150	5.43	3.43	12598	MVR150/U/MED	M102	6		15000	14000	10500	4300	65	Clear			118
		E	U	150	5.43	3.43	12604	MVR150/C/U/MED	M102	6		15000	13300	10000	3900	70	Coated			118
175 Watts																				
ED23.5	E39	E	VBU	175	7.50	5.00	22342	MXR175/VBU/PA	M137/ M152	6		15000	17000	12500	3200	65	Clear		43	117
		E	VBU	175	7.50	5.00	11185	MXR175/CVBU/PA	M137/ M152	6		15000	16000	12000	3200	65	Coated		43	117
		E	VBU	175	7.50	5.00	12622	MVR175/VBU/PA	M137/ M152	6		15000	17500	13000	4000	75	Clear		43	117
		E	VBU	175	7.50	5.00	12633	MVR175/CVBU/PA	M137/ M152	6		15000	16500	12500	4000	75	Coated		43	117
BD17	E26	E	VBU	175	5.75	3.43	12636	MXR175/VBU/MEDPA	M137/ M152	6		15000	17500	13000	4000	75	Clear		43	117
		E	VBU	175	5.75	3.43	12637	MVR175/CVBU/MEDPA	M137/ M152	6		15000	16500	12500	4000	75	Coated		43	117
250 Watts																				
ED28	E39	E	U	250	8.25	5.00	78665	MVR250/U/PA	M138/ M153	12		12000H/ 15000V	18600H/ 22400V	12000H/ 14000V	3900	62	Clear		43	116
		E	VBU	250	8.25	5.00	26317	MVR250/VBU/PA	M138/ M153	12		15000	23000	17000	4200	65	Clear		43	116
		E	VBU	250	8.25	5.00	26319	MVR250/CVBU/PA	M138/ M153	12		15000	21500	15500	3900	65	Coated		43	116
		E	HOR	250	8.25	5.00	72882	MVR250/HOR/PA	M138/ M153	12		12000	20000	13700	4400	60	Clear		43	117

Metal Halide

HID Electronic and Electromagnetic Ballasts For 20 - 175W Metal Halide HID Lamps

86667 - GEM10048TLC3D-5

Metal Halide

1 - 100W MH M90 or M140 480

General characteristics

Ballast Type	Magnetic - Core and Coil
ANSI Lamp Codes	M90 or M140
Voltage	480
Line Voltage Regulation (v/%)	5%
Circuit Type	HK-HPF
Insulation Class	180C
Type of Capacitor	Poly film
Capacitance	17 MFD GECAP-12/280V-D
Voltage (MIN)	280
Capacitor Temperature Rating	100°C (212°F)
UL Igniter	MH350-JA
Sound Rating	
Additional Info	

Electrical characteristics

Supply Current Frequency	60 Hz
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Order information

Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage

Lamp	Specifications by line voltage
M90, M140	480
100W Ceramic Metal Halide	System Wattage (W)
	Nominal Current
	Ballast Factor
	Ballast Efficiency Factor
	Max Input Current
	Starting Current
	Open Circuit Voltage
	Drop Out Voltage
	Power Factor (p-f)
	Min. Starting Temp (°F/°C)
	Fuse Rating
	UL Remh. Top Rise

Safety and performance cUL Listed UL Listed

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coded leads, a properly rated capacitor and igniter (if required) and all other components required for ballast replacement

Dimensions

Wiring diagram HID W-IF-87068-86667 - see example on page 18-63	
Case dimensions - Ref Drawing PCL - see page 18-66	
Length (L)	5.25 in (133 mm)
Width (W)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (M)	4.6 in (117 mm)
Mount Width (K or F)	0.75 in (19 mm)
Mount Spacing (S)	2.0
A	2.0
B	3.0
Weight	5.00 lbs
Case Type	Side
Nominal Length	2.7 in (69 mm)
Frame Size (H x L)	2.813 in x 3.939 in

Tech 2: Towson Arena

FF1: (1) 100W vertical site fixture metal halide lamp with 480V magnetic ballast

High Intensity Discharge Lamps															Page Updated 09 / 2010					
Bulb Shape	Base	LET	OP	Watts	MOL (in)	LCL (in)	Order Code	Description	ANSI Ballast Type	Case Qty	CBCP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp K	CRI	Additional Information	Reduced Watts/High Color Rendering	Footnotes	Warning and Caution Notices
PulseArc® Multi-Vapor® Metal Halide Lamps																				
50 Watts																				
BD17	E26	E	U	50	5.43	3.43	10361	MXR50/U/MED	M110	6		10000	3200	2100	3700	60	Clear			118
		E	U	50	5.43	3.43	10364	MXR50/C/U/MED	M110	6		10000	3000	2000	3400	65	Coated			118
70 Watts																				
BD17	E26	E	U	70	5.43	3.43	22158	MXR70/U/MED	M98	6		12000	5500	3500	3200	70	Clear			118
		E	U	70	5.43	3.43	22162	MXR70/C/U/MED	M98	6		12000	5300	3300	3200	70	Coated			118
		E	U	70	5.43	3.43	12590	MVR70/U/MED	M98	6		12000	4700	3000	4000	70	Clear			118
		E	U	70	5.43	3.43	12594	MVR70/C/U/MED	M98	6		12000	4500	2800	4000	70	Coated			118
100 Watts																				
BD17	E26	E	U	100	5.43	3.43	18680	MXR100/U/MED	M90	6		15000	9000	6200	3200	70	Clear			118
		E	U	100	5.43	3.43	18679	MXR100/C/U/MED	M90	6		15000	8500	5900	3200	70	Coated			118
		E	U	100	5.43	3.43	12652	MVR100/U/MED	M90	6		15000	8100	5800	4000	70	Clear			118
		E	U	100	5.43	3.43	12653	MVR100/C/U/MED	M90	6		15000	7600	4900	4000	70	Coated			118
150 Watts																				
BD17	E26	E	U	150	5.43	3.43	22935	MXR150/U/MED	M102	6		15000	13300	10000	3400	60	Clear			118
		E	U	150	5.43	3.43	22936	MXR150/C/U/MED	M102	6		15000	12600	9500	3100	60	Coated			118
		E	U	150	5.43	3.43	12598	MVR150/U/MED	M102	6		15000	14000	10500	4300	65	Clear			118
		E	U	150	5.43	3.43	12604	MVR150/C/U/MED	M102	6		15000	13300	10000	3900	70	Coated			118
175 Watts																				
ED23.5	E39	E	VBU	175	7.50	5.00	22342	MXR175/VBU/PA	M137/M152	6		15000	17000	12500	3200	65	Clear		43	117
		E	VBU	175	7.50	5.00	11185	MXR175/CVBU/PA	M137/M152	6		15000	16000	12000	3200	65	Coated		43	117
		E	VBU	175	7.50	5.00	12622	MVR175/VBU/PA	M137/M152	6		15000	17500	13000	4000	75	Clear		43	117
		E	VBU	175	7.50	5.00	12633	MVR175/CVBU/PA	M137/M152	6		15000	16500	12500	4000	75	Coated		43	117
BD17	E26	E	VBU	175	5.75	3.43	12636	MXR175/VBU/MEDPA	M137/M152	6		15000	17500	13000	4000	75	Clear		43	117
		E	VBU	175	5.75	3.43	12637	MVR175/CVBU/MEDPA	M137/M152	6		15000	16500	12500	4000	75	Coated		43	117
250 Watts																				
ED28	E39	E	U	250	8.25	5.00	78665	MVR250/U/PA	M138/M153	12		12000H/15000V	18600H/22400V	12000H/14000V	3900	62	Clear		43	116
		E	VBU	250	8.25	5.00	26317	MVR250/VBU/PA	M138/M153	12		15000	23000	17000	4200	65	Clear		43	116
		E	VBU	250	8.25	5.00	26319	MVR250/CVBU/PA	M138/M153	12		15000	21500	15500	3900	65	Coated		43	116
		E	HOR	250	8.25	5.00	72882	MVR250/HOR/PA	M138/M153	12		12000	20000	13700	4400	60	Clear		43	117

Metal Halide

HID Electronic and Electromagnetic Ballasts For 20 - 175W Metal Halide HID Lamps

86667 - GEM10048TLC3D-5

Metal Halide

1 - 100W MH M90 or M140 480

General characteristics

Ballast Type	Magnetic - Core and Coil
ANSI Lamp Codes	M90 or M140
Voltage	480
Line Voltage Regulation (v/%)	5%
Circuit Type	HK-HPF
Insulation Class	180C
Type of Capacitor	Poly Film
Capacitance	12 MFD GE CAP-12/280V-D
Voltage (MIN)	280
Capacitor Temperature Rating	100°C (212°F)
GE Part#	MH350-JA
Sound Rating	
Additional Info	

Electrical characteristics

Supply Current Frequency	60 Hz
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Order information

Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage

Lamp	Specifications by line voltage
M90, M140	480
100W Ceramic Metal Halide	System Wattage (W)
	Nominal Current
	Ballast Factor
	Ballast Efficiency Factor
	Max Input Current
	Starting Current
	Open Circuit Voltage
	Drop Out Voltage
	Power Factor @ 50%
	Min. Starting Temp (°F/°C)
	Fuse Rating
	UL Remth. Top Rise

Safety and performance



- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coded leads, a properly rated capacitor and ignitor (if required) and all other components required for ballast replacement

Dimensions

Wiring diagram HID W-FI-87068-86667 - see example on page 18-63	
Case dimensions - Ref Drawing PCL - see page 18-66	
Length (L)	5.25 in (133 mm)
Width (W)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (M)	4.6 in (117 mm)
Mount Width (K or F)	0.75 in (19 mm)
Mount Spacing (S)	2.0
A	2.0
B	3.0
Weight	5.00 lbs
Case Type	Side
Nominal Length	2.7 in (69 mm)
Frame Size (H x L)	2.813 in x 3.939 in

Tech 2: Towson Arena

GG: (1) 150W vertical site fixture metal halide lamp with magnetic ballast

High Intensity Discharge Lamps																Page Updated 09 / 2010					
Ball Shape	Base	LET	OP	Watts	MFL Dia	LCL Dia	Order Code	Description	ANSI Ballast Type	Case Qty	CRCP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp. K	CRI	Additional Information	Reduced Watts/High Color Rendering	Footnotes	Warning and Caution Notices	
PulseArc® Multi-Vapor® Metal Halide Lamps																					
50 Watts																					
8017	E26	E	U	50	5.43	3.43	30361	MWR50/U/MED	M110	6		10000	3200	2100	3700	60	Clear			118	
				50	5.43	3.43	30364	MWR50/CU/MED	M110	6		10000	3000	2000	3400	65	Coated			118	
70 Watts																					
8017	E26	E	U	70	5.43	3.43	22158	MWR70/U/MED	M98	6		12000	5500	3500	3200	70	Clear			118	
				70	5.43	3.43	22162	MWR70/CU/MED	M98	6		12000	5300	3300	3200	70	Coated			118	
				70	5.43	3.43	12590	MVR70/U/MED	M98	6		12000	4700	3000	4000	70	Clear			118	
				70	5.43	3.43	12594	MVR70/CU/MED	M98	6		12000	4500	2800	4000	70	Coated			118	
100 Watts																					
8017	E26	E	U	100	5.43	3.43	18680	MWR100/U/MED	M90	6		15000	9000	6200	3200	70	Clear			118	
				100	5.43	3.43	18679	MWR100/CU/MED	M90	6		15000	8500	5900	3200	70	Coated			118	
				100	5.43	3.43	12652	MVR100/U/MED	M90	6		15000	8100	5800	4000	70	Clear			118	
				100	5.43	3.43	12653	MVR100/CU/MED	M90	6		15000	7600	4900	4000	70	Coated			118	
150 Watts																					
8017	E26	E	U	150	5.43	3.43	22935	MWR150/U/MED	M102	6		15000	13300	10000	3400	60	Clear			118	
				150	5.43	3.43	22936	MWR150/CU/MED	M102	6		15000	12600	9500	3100	60	Coated			118	
				150	5.43	3.43	12598	MVR150/U/MED	M102	6		15000	14000	10500	4300	65	Clear			118	
				150	5.43	3.43	12604	MVR150/CU/MED	M102	6		15000	13300	10000	3900	70	Coated			118	
175 Watts																					
E023.5	E39	E	VBU	175	7.50	5.00	22342	MWR175/VBU/PA	M137/M152	6		15000	17000	12500	3200	65	Clear			43	117
				175	7.50	5.00	11185	MVR175/CV/BU/PA	M137/M152	6		15000	16000	12000	3200	65	Coated			43	117
				175	7.50	5.00	12622	MVR175/VBU/PA	M137/M152	6		15000	17500	13000	4000	75	Clear			43	117
				175	7.50	5.00	12633	MVR175/CV/BU/PA	M137/M152	6		15000	16500	12500	4000	75	Coated			43	117
8017	E26	E	VBU	175	5.75	3.43	12636	MVR175/VBU/MEDPA	M137/M152	6		15000	17500	13000	4000	75	Clear			43	117
				175	5.75	3.43	12637	MVR175/CV/BU/MEDPA	M137/M152	6		15000	16500	12500	4000	75	Coated			43	117
250 Watts																					
E028	E39	E	U	250	8.25	5.00	78665	MVR250/U/PA	M138/M153	12		12000H/15000V	18600H/22400V	12000H/14000V	3900	62	Clear			43	116
				250	8.25	5.00	26317	MVR250/VBU/PA	M138/M153	12		15000	23000	17000	4200	65	Clear			43	116
				250	8.25	5.00	26319	MVR250/CV/BU/PA	M138/M153	12		15000	21500	15500	3900	65	Coated			43	116
				250	8.25	5.00	72882	MVR250/HOR/PA	M138/M153	12		12000	20000	13700	4400	60	Clear			43	117

86718 – GEM150MLTLC3D-5

Metal Halide


1 – 150W MH M102 or M142 Quad (120/208/240/277V)

General characteristics	
Ballast Type	Magnetic – Core and Coil
ANSI Lamp Codes	M142, M102
Voltage	120/208/240/277
Line Voltage Regulation (+/-)	5%
Circuit Type	HX, HPF
Insulation Class	180C
Type of Capacitor	Dry film
Capacitance	16 Mfd GECAP-16/280V-D
Voltage (MIN)	300
Capacitor Temperature Rating	100°C (212°F)
GE Igniter	MH350-1A
Sound Rating	
Additional Info	

Electrical characteristics	
Supply Current Frequency	60 Hz

Order information		
Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage					
Lamp	Specifications by line voltage	120	208	240	277
M142, M102	System Wattage (W)	186	186	186	186
	Nominal Current	1.60 A	1.00 A	0.80 A	0.70 A
Ceramic	Ballast Factor	1	1	1	1
	Ballast Efficiency Factor	0.81	0.81	0.81	0.81
150W	Max Input Current	3.37 A	1.95 A	1.68 A	1.39 A
	Starting Current	1.86 A	1.03 A	0.89 A	0.77 A
Metal Halide	Open Circuit Voltage	257V	257V	257V	257V
	Drop Out Voltage	96V	166V	192V	222V
Quartz	Power Factor l= %	90	90	90	90
	Min. Starting Temp (°F/°C)	-22/-30	-22/-30	-22/-30	-22/-30
Fuse Rating		10	5	5	4
	UL Bench Top Rise	A	B	A	A

Safety and performance cUL Listed  UL Listed

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coded leads, a properly rated capacitor and igniter (if required) and all other components required for ballast replacement
- Quad ballast (120, 208, 240, 277)

Dimensions	
Wiring diagram HID W-IH-86675-86718 – see example on page 18-63	
Case dimensions – Ref Drawing PC1 – see page 18-66	
Length (L)	5.25 in (133 mm)
Width (W)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (M)	4.6 in (117 mm)
Mount Width (X or F)	
Mount Slots (MS)	0.25 in (6 mm)
A	2.5
B	4.0
Weight	7.00 lbs
Exit Type	Side
Nominal Length	2.7 in (69 mm)
Frame Size (H x L)	2.813 in x 4.939 in

Tech 2: Towson Arena

HH1: (1) 250W horizontal metal halide lamp with magnetic ballast

High Intensity Discharge Lamps															Page Updated 09 / 2010						
Ball Shape	Base	LET	OP	Watts	MFL Dia	LCL Dia	Order Code	Description	ANSI Ballast Type	Case Qty	CRCP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp. K	CRI	Additional Information	Reduced Watts/High Color Rendering	Footnotes	Warning and Caution Notices	
PulseArc® Multi-Vapor® Metal Halide Lamps																					
50 Watts																					
BD17	E26	E	U	50	5.43	3.43	30361	MVR50/U/MED	M110	6		10000	3200	2100	3700	60	Clear			118	
				50	5.43	3.43	30364	MVR50/CU/MED	M110	6		10000	3000	2000	3400	65	Coated			118	
70 Watts																					
BD17	E26	E	U	70	5.43	3.43	22158	MVR70/U/MED	M98	6		12000	5500	3500	3200	70	Clear			118	
				70	5.43	3.43	22162	MVR70/CU/MED	M98	6		12000	5300	3300	3200	70	Coated			118	
				70	5.43	3.43	12590	MVR70/U/MED	M98	6		12000	4700	3000	4000	70	Clear			118	
				70	5.43	3.43	12594	MVR70/CU/MED	M98	6		12000	4500	2800	4000	70	Coated			118	
100 Watts																					
BD17	E26	E	U	100	5.43	3.43	18680	MVR100/U/MED	M90	6		15000	9000	6200	3200	70	Clear			118	
				100	5.43	3.43	18679	MVR100/CU/MED	M90	6		15000	8500	5900	3200	70	Coated			118	
				100	5.43	3.43	12652	MVR100/U/MED	M90	6		15000	8100	5800	4000	70	Clear			118	
				100	5.43	3.43	12653	MVR100/CU/MED	M90	6		15000	7600	4900	4000	70	Coated			118	
150 Watts																					
BD17	E26	E	U	150	5.43	3.43	22935	MVR150/U/MED	M102	6		15000	13300	10000	3400	60	Clear			118	
				150	5.43	3.43	22936	MVR150/CU/MED	M102	6		15000	12600	9500	3100	60	Coated			118	
				150	5.43	3.43	12598	MVR150/U/MED	M102	6		15000	14000	10500	4300	65	Clear			118	
				150	5.43	3.43	12604	MVR150/CU/MED	M102	6		15000	13300	10000	3900	70	Coated			118	
175 Watts																					
ED23.5	E39	E	VBU	175	7.50	5.00	22342	MVR175/VBU/PA	M137/M152	6		15000	17000	12500	3200	65	Clear			43	117
				175	7.50	5.00	11185	MVR175/CVBU/PA	M137/M152	6		15000	16000	12000	3200	65	Coated			43	117
				175	7.50	5.00	12622	MVR175/VBU/PA	M137/M152	6		15000	17500	13000	4000	75	Clear			43	117
				175	7.50	5.00	12633	MVR175/CVBU/PA	M137/M152	6		15000	16500	12500	4000	75	Coated			43	117
BD17	E26	E	VBU	175	5.75	3.43	12636	MVR175/VBU/MEDPA	M137/M152	6		15000	17500	13000	4000	75	Clear			43	117
				175	5.75	3.43	12637	MVR175/CVBU/MEDPA	M137/M152	6		15000	16500	12500	4000	75	Coated			43	117
250 Watts																					
ED28	E39	E	U	250	8.25	5.00	78665	MVR250/U/PA	M138/M153	12		12000H/15000V	18600H/22400V	12000H/14000V	3900	62	Clear			43	116
				250	8.25	5.00	26317	MVR250/VBU/PA	M138/M153	12		15000	23000	17000	4200	65	Clear			43	116
				250	8.25	5.00	26319	MVR250/CVBU/PA	M138/M153	12		15000	21500	15500	3900	65	Coated			43	116
				250	8.25	5.00	72882	MVR250/HOR/PA	M138/M153	12		12000	20000	13700	4400	60	Clear			43	117

Metal Halide HID Electronic and Electromagnetic Ballasts For 250 - 1500W Metal Halide HID Lamps

87211 - GEM250ML5AC3-5

Metal Halide

1 - 250W MH M58 or H37 5-Tap [12Q/20R/24Q/27T/480V]

General characteristics

Ballast Type	Magnetic - Core and Coil
ANSI Lamp Codes	M58, H37
Voltage	120/208/240/277/480
Line Voltage Regulation (%)	±0%
Circuit Type	FWA
Insulation Class	1B0C
Type of Capacitor	Oil-filled
Capacitance	15.0MFD GECAP-15/480V-0
Voltage/MIN	400
Capacitor Temperature Rating	105°C (212°F)
Oil Spender	
Sound Rating	
Additional Info	

Electrical characteristics

Supply Current Frequency	60 Hz
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Order information

Type		No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit		1	6

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coated leads, a properly rated capacitor and ignitor (if required) and all other components required for ballast replacement
- 5-tap ballast (12Q, 20R, 24Q, 27T, or 480 volt) featuring a 480-volt tap

Dimensions

Writing diagram - HID M-01-86808-87211 - see example on page 18-64

Case dimensions - Ref Drawing PC1 - see page 18-56

Length (L)	5.25 in (133 mm)
Width (W)	3.25 in (83 mm)

Mounting dimensions

Mount Length (M)	4.6 in (117 mm)
Mount Width (W)	4.4
Mount Slots (MS)	0.25 in (6 mm)
A	3.0
B	4.4
Weight	9.00 lbs
Lead Type	Soft
Normal Length	12 in (303 mm)
Frame Size (H x L)	2.813 in x 4.939 in

Lead lengths

Orange	
Violet and Black	
Violet/White	
Black/White	

Specifications by lamp and line voltage

Lamp	Specifications by line voltage	240	277	480
M58 H37	System Wattage (W)	240	288	280
250W Quartz Metal Halide	Nominal Current	2.30A	1.80A	1.10A
	Ballast Factor	1	1	0.65A
175W Quartz Metal Halide	Ballast Efficiency Factor	0.89	0.89	0.89
	Max Input Current	2.60A	1.80A	1.20A
250W Mercury	Starting Current	1.60A	1.00A	0.60A
	Open Circuit Voltage	290V	290V	290V
	Drop Out Voltage	96V	160V	220V
	Fuse Factor (A) @ 100°C	60	60	60
	Min. Starting Temp (°F/°C)	-22/-30	-22/-30	-22/-30
	Fuse Rating	8	4	2
	UL Bench Tap Size	B	B	C

Safety and performance UL Listed

Tech 2: Towson Arena

HH2: (2) 250W horizontal metal halide lamp with magnetic ballast

High Intensity Discharge Lamps															Page Updated 09 / 2010						
Ball Shape	Base	LET	OP	Watts	MFL Dia.	ICL Dia.	Order Code	Description	ANSI Ballast Type	Case Qty	CRCP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp. K	CRI	Additional Information	Reduced Watts/High Color Rendering	Footnotes	Warning and Caution Notices	
PulseArc® Multi-Vapor® Metal Halide Lamps																					
50 Watts																					
BD17	E26	E	U	50	5.43	3.43	30361	MVR50/U/MED	M110	6		10000	3200	2100	3700	60	Clear			118	
				50	5.43	3.43	30364	MVR50/CU/MED	M110	6		10000	3000	2000	3400	65	Coated			118	
70 Watts																					
BD17	E26	E	U	70	5.43	3.43	22158	MVR70/U/MED	M98	6		12000	5500	3500	3200	70	Clear			118	
				70	5.43	3.43	22162	MVR70/CU/MED	M98	6		12000	5300	3300	3200	70	Coated			118	
				70	5.43	3.43	12590	MVR70/U/MED	M98	6		12000	4700	3000	4000	70	Clear			118	
				70	5.43	3.43	12594	MVR70/CU/MED	M98	6		12000	4500	2800	4000	70	Coated			118	
100 Watts																					
BD17	E26	E	U	100	5.43	3.43	18680	MVR100/U/MED	M90	6		15000	9000	6200	3200	70	Clear			118	
				100	5.43	3.43	18679	MVR100/CU/MED	M90	6		15000	8500	5900	3200	70	Coated			118	
				100	5.43	3.43	12652	MVR100/U/MED	M90	6		15000	8100	5800	4000	70	Clear			118	
				100	5.43	3.43	12653	MVR100/CU/MED	M90	6		15000	7600	4900	4000	70	Coated			118	
150 Watts																					
BD17	E26	E	U	150	5.43	3.43	22935	MVR150/U/MED	M102	6		15000	13300	10000	3400	60	Clear			118	
				150	5.43	3.43	22936	MVR150/CU/MED	M102	6		15000	12600	9500	3100	60	Coated			118	
				150	5.43	3.43	12598	MVR150/U/MED	M102	6		15000	14000	10500	4300	65	Clear			118	
				150	5.43	3.43	12604	MVR150/CU/MED	M102	6		15000	13300	10000	3900	70	Coated			118	
175 Watts																					
ED23.5	E39	E	VBU	175	7.50	5.00	22342	MVR175/VBU/PA	M137/M152	6		15000	17000	12500	3200	65	Clear			43	117
				175	7.50	5.00	11185	MVR175/CVBU/PA	M137/M152	6		15000	16000	12000	3200	65	Coated			43	117
				175	7.50	5.00	12622	MVR175/VBU/PA	M137/M152	6		15000	17500	13000	4000	75	Clear			43	117
				175	7.50	5.00	12633	MVR175/CVBU/PA	M137/M152	6		15000	16500	12500	4000	75	Coated			43	117
BD17	E26	E	VBU	175	5.75	3.43	12636	MVR175/VBU/MEDPA	M137/M152	6		15000	17500	13000	4000	75	Clear			43	117
				175	5.75	3.43	12637	MVR175/CVBU/MEDPA	M137/M152	6		15000	16500	12500	4000	75	Coated			43	117
250 Watts																					
ED28	E39	E	U	250	8.25	5.00	78665	MVR250/U/PA	M138/M153	12		12000H/15000V	18600H/22400V	12000H/14000V	3900	62	Clear			43	116
				250	8.25	5.00	26317	MVR250/VBU/PA	M138/M153	12		15000	23000	17000	4200	65	Clear			43	116
				250	8.25	5.00	26319	MVR250/CVBU/PA	M138/M153	12		15000	21500	15500	3900	65	Coated			43	116
				250	8.25	5.00	72882	MVR250/HOR/PA	M138/M153	12		12000	20000	13700	4400	60	Clear			43	117

Metal Halide

HID Electronic and Electromagnetic Ballasts For 250 - 1500W Metal Halide HID Lamps

87211 - GEM250ML5AC3-5
Metal Halide
1 - 250W MH M58 or H37 5-tap (120/208/240/277/480V)

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coated leads, a properly rated capacitor and igniter (if required) and all other components required for ballast replacement
- 5-tap ballast (120, 208, 240, 277, or 480 volt) featuring a 480-volt tap

General characteristics	
Ballast Type	Magnetic - Core and Coil
ANSI Lamp Codes	M58, H37
Voltage	120/208/240/277/480
Line Voltage Regulation (%)	±3%
Circuit Type	FWA
Insulation Class	F180C
Type of Capacitor	Oil-filled
Capacitance	15.0MFD GECAP-15/480V-0
Voltage/MIN	400
Capacitor Temperature Rating	105°C (212°F)
IG Starter	
Sound Rating	
Additional Info	

Electrical characteristics	
Supply Current Frequency	60 Hz

Order information		
Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage				
Lamp	Specifications by line voltage	240	277	480
M58 H37	System Wattage (W)	240	280	480
250W Quartz		280	280	280
Metal Halide	Nominal Current	2.30A	1.60A	1.10A
		1.60A	1.75A	0.65A
175W Quartz	Ballast Factor	1	1	1
Metal Halide	Ballast Efficiency Factor	0.89	0.89	0.89
	Max Input Current	2.60A	1.80A	1.20A
250W Mercury	Starting Current	1.60A	1.00A	0.60A
	Open Circuit Voltage	290V	290V	290V
	Drop Out Voltage	160V	100V	220V
	Fuse Factor (A/In)	60	60	60
	Min. Starting Temp (°F/°C)	-22/-30	-22/-30	-22/-30
	Fuse Rating	8	5	2
	UL Bench Tap Size	B	B	C

Safety and performance cUL Listed UL Listed

Tech 2: Towson Arena

JJ: (1) 150W metal halide lamp with magnetic ballast

High Intensity Discharge Lamps															Page Updated 09 / 2010						
Ball Shape	Base	LET	OP	Watts	MFL Dia	LCL Dia	Order Code	Description	ANSI Ballast Type	Case Qty	CRCP	Rated Life (hrs)	Initial Lumens	Mean Lumens	Color Temp. K	CRI	Additional Information	Reduced Watts/High Color Rendering	Footnotes	Warning and Caution Notices	
PulseArc® Multi-Vapor® Metal Halide Lamps																					
50 Watts																					
8017	E26	E	U	50	5.43	3.43	30361	MWR50/U/MED	M110	6		10000	3200	2100	3700	60	Clear			118	
		E	U	50	5.43	3.43	30364	MWR50/CU/MED	M110	6		10000	3000	2000	3400	65	Coated			118	
70 Watts																					
8017	E26	E	U	70	5.43	3.43	22158	MWR70/U/MED	M98	6		12000	5500	3500	3200	70	Clear			118	
		E	U	70	5.43	3.43	22162	MWR70/CU/MED	M98	6		12000	5300	3300	3200	70	Coated			118	
		E	U	70	5.43	3.43	12590	MVR70/U/MED	M98	6		12000	4700	3000	4000	70	Clear			118	
		E	U	70	5.43	3.43	12594	MVR70/CU/MED	M98	6		12000	4500	2800	4000	70	Coated			118	
100 Watts																					
8017	E26	E	U	100	5.43	3.43	18680	MWR100/U/MED	M90	6		15000	9000	6200	3200	70	Clear			118	
		E	U	100	5.43	3.43	18679	MWR100/CU/MED	M90	6		15000	8500	5900	3200	70	Coated			118	
		E	U	100	5.43	3.43	12652	MVR100/U/MED	M90	6		15000	8100	5800	4000	70	Clear			118	
		E	U	100	5.43	3.43	12653	MVR100/CU/MED	M90	6		15000	7600	4900	4000	70	Coated			118	
150 Watts																					
8017	E26	E	U	150	5.43	3.43	22935	MWR150/U/MED	M102	6		15000	13300	10000	3400	60	Clear			118	
		E	U	150	5.43	3.43	22936	MWR150/CU/MED	M102	6		15000	12600	9500	3100	60	Coated			118	
		E	U	150	5.43	3.43	12598	MVR150/U/MED	M102	6		15000	14000	10500	4300	65	Clear			118	
		E	U	150	5.43	3.43	12604	MVR150/CU/MED	M102	6		15000	13300	10000	3900	70	Coated			118	
175 Watts																					
E023.5	E39	E	VBU	175	7.50	5.00	22342	MWR175/VBU/PA	M137/M152	6		15000	17000	12500	3200	65	Clear			43	117
		E	VBU	175	7.50	5.00	11185	MVR175/CVBU/PA	M137/M152	6		15000	16000	12000	3200	65	Coated			43	117
		E	VBU	175	7.50	5.00	12622	MVR175/VBU/PA	M137/M152	6		15000	17500	13000	4000	75	Clear			43	117
		E	VBU	175	7.50	5.00	12633	MVR175/CVBU/PA	M137/M152	6		15000	16500	12500	4000	75	Coated			43	117
8017	E26	E	VBU	175	5.75	3.43	12636	MVR175/VBU/MEDPA	M137/M152	6		15000	17500	13000	4000	75	Clear			43	117
		E	VBU	175	5.75	3.43	12637	MVR175/CVBU/MEDPA	M137/M152	6		15000	16500	12500	4000	75	Coated			43	117
250 Watts																					
E028	E39	E	U	250	8.25	5.00	78665	MVR250/U/PA	M138/M153	12		12000H/15000V	18600H/22400V	12000H/14000V	3900	62	Clear			43	116
		E	VBU	250	8.25	5.00	26317	MVR250/VBU/PA	M138/M153	12		15000	23000	17000	4200	65	Clear			43	116
		E	VBU	250	8.25	5.00	26319	MVR250/CVBU/PA	M138/M153	12		15000	21500	15500	3900	65	Coated			43	116
		E	HOR	250	8.25	5.00	72802	MVR250/HOR/PA	M138/M153	12		12000	20000	13700	4400	60	Clear			43	117

86718 – GEM150MLTLC3D-5

Metal Halide


1 – 150W MH M102 or M142 Quad (120/208/240/277V)

General characteristics	
Ballast Type	Magnetic – Core and Coil
ANSI Lamp Codes	M142, M102
Voltage	120/208/240/277
Line Voltage Regulation (+/-)	5%
Circuit Type	HX, HPF
Insulation Class	180C
Type of Capacitor	Dry film
Capacitance	16 Mfd GE CAP-16/280V-D
Voltage (MIN)	300
Capacitor Temperature Rating	100°C (212°F)
GE Igniter	MH350-1A
Sound Rating	
Additional Info	

Electrical characteristics	
Supply Current Frequency	60 Hz

Order information		
Type	No. Items Per Sales Unit	No. Items Per Standard Package
Distributor Kit	1	6

Specifications by lamp and line voltage					
Lamp	Specifications by line voltage	120	208	240	277
M142, M102	System Wattage (W)	186	186	186	186
	Nominal Current	1.60 A	1.00 A	0.80 A	0.70 A
Ceramic	Ballast Factor	1	1	1	1
	Ballast Efficiency Factor	0.81	0.81	0.81	0.81
150W	Max Input Current	3.37 A	1.95 A	1.68 A	1.39 A
	Startling Current	1.86 A	1.03 A	0.89 A	0.77 A
Quartz	Open Circuit Voltage	257V	257V	257V	257V
	Drop Out Voltage	96V	166V	192V	222V
Metal Halide	Power Factor l= %	90	90	90	90
	Min. Starting Temp (°F/°C)	-22/-30	-22/-30	-22/-30	-22/-30
Fuse Rating		10	5	5	4
	UL Bench Top Rise	A	B	A	A

Safety and performance cUL Listed  UL Listed

- Magnetic ballast construction ideal for a wide variety of lighting applications
- Precision-wound coils, ensuring even heat dissipation and the highest electrical integrity
- Distributor replacement kit contains the appropriate core and coil with color coded leads, a properly rated capacitor and igniter (if required) and all other components required for ballast replacement
- Quad ballast (120, 208, 240, 277)

Dimensions	
Wiring diagram HID W-IH-86675-86718 – see example on page 18-63	
Case dimensions – Ref Drawing PC1 – see page 18-66	
Length (L)	5.25 in (133 mm)
Width (W)	1.25 in (32 mm)
Mounting dimensions	
Mount Length (M)	4.6 in (117 mm)
Mount Width (X or F)	
Mount Slots (MS)	0.25 in (6 mm)
A	2.5
B	4.0
Weight	7.00 lbs
Exit Type	Side
Nominal Length	2.7 in (69 mm)
Frame Size (H x L)	2.813 in x 4.939 in