# SOMAR INTERNATIONAL LTD. 30/3/2006

# COMPARISION REPORT - POWERBOSS ELUMA vs 400W METAL HALIDE

Presented By: Keith Wyatt, Commercial General Manager, Somar International Ltd

## DESIGN CRITERIA

Dimensions of room: 54m x 18m x 8m measured at point 0,0 Z co-ordinate

Criteria: 300 lux maintained.

## OPTION 1: POWERBOSS ELUMA LUMINAIRE

Design criteria: 3 rows of 8 no. (24 no.) Powerboss Eluma achieves an average illuminance of 328 lux.

It is important that one refers to the uniformity achieved from the Eluma design.

## OPTION 2: GLAMOX GDH 400W LUMINAIRE

Design criteria: Utilising 20 no. Glamox GDH 400W luminaire.

A high end specification product with Glamox R1 reflector, achieves an average illuminance of 300 lux

## DESIGN ISSUES

The issues that should be taken into account from the two designs :

1. Circuit load of Eluma solution - 5.5 kW

   Circuit load of standard line metal halide solution - 9 kW

2. Uniformity from Eluma solution superior to the point source glare associated with the elliptical high bay metal halide solution

3. Rated life of compact constant fluorescent lamp from Osram: 15,000 hours with a 10% lumen decay

   Rated life of 400W standard line elliptical GES metal halide light source: 6,000 hours with a 35% lumen decay.

## TECHNICAL SUMMARY

While the design criteria can be achieved with 20 no. 400W metal halide luminaires initially, after 6,000 hours the aspiration of the design will be compromised due to the significant lumen mortality associated with metal halide lighting solutions. This is a common factor with all forms of standard line metal halide, both in tubular and elliptical format.

This is particularly evident in high bay installations, or applications where access is difficult i.e. retail outlets, busy high racking installations at 12 meters and over.

The following elements should also be taken into account:

1. Point source glare
2. Distinct lack of uniformity due to scalloping and effective nature of the optical design of high bay criteria
3. Hot restrike time associated with standard line discharge lighting solutions
4. Potential compromise with BS5266
5. Lower than acceptable power factor i.e. in the order of 0.8 relative to unity with Quicktronic Professional Osram control circuitry employed by Eluma
6. Discharge solution cannot embrace integrated occupancy and daylight control which is a prerequisite of Eluma technology
7. Rated useful life of lamps
8. Cost replacement of lamps i.e. metal halide –v- constant 55W high output lamps
9. Rendering ability
10. Flickering and strobescopics typically associated with 50 Hz control gear
11. Potential issue with enclosing high temperature discharge lamps
12. Depth of typical high bay luminaires i.e. 1.2 meters relative to 0.1 meter in the case of Eluma (possible racking implications)

The proposed set of measures from Eluma provides optimum lighting solutions in applications over 5 meters.

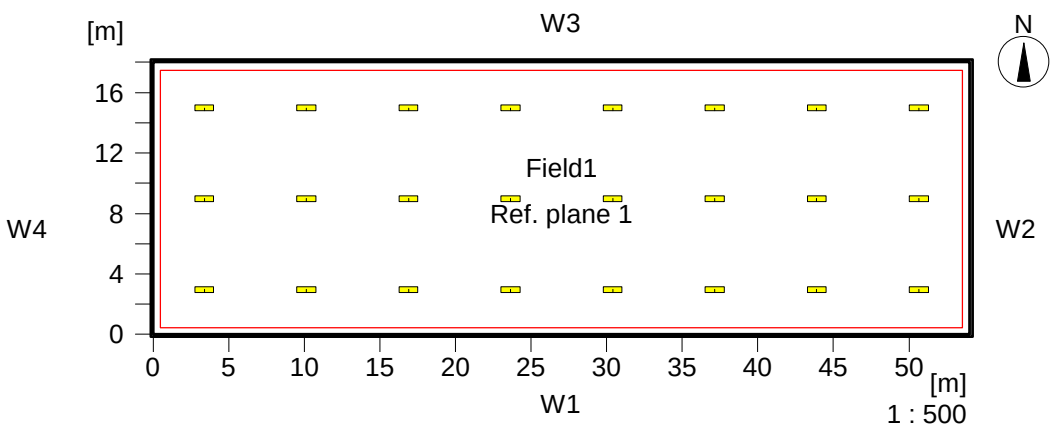
## RETRO-FIT PROJECTS

Such applications where a retrofit project has been implemented as follows:

- **Exel Logistics**
- **Wincanton**
- **Tyco**
- **Fyffes Group**
- **Pfizers**
- **Cadburys**
- **Pepsi**
- **Coca Cola**
- **Dell Computers**
- **Lidl**
- **De Beers**
- **Lufthansa**

Object : AS455
Installation : SOMAR
Project number : 380
Date : 28.03.2006

## Floor plan




**Room data:**

| | | |
|---|---|---|
| W1 | : | 54.00 |
| W2 | : | 18.00 |
| W3 | : | 54.00 |
| W4 | : | 18.00 |
| W5 | : | ----- |
| W6 | : | ----- |
| Floor: | | ----- |
| Ceiling: | | ----- |

Room height [m]: 8.00
Height of reference plane [m]: 0.00
Height of luminaire plane [m]: 8.00

**Reflectance:**

| |
|---|
| 50.0 % |
| 50.0 % |
| 50.0 % |
| 50.0 % |
| ----- |
| ----- |
| 20.0 % |
| 70.0 % |

**Structural elements**

Pi : Pillar
Tr : Partition
Wo : Real working surface
m : Virtual measuring area
S : Skylight
Pc : Picture
Wi : Window
DF : Door
F : Furniture

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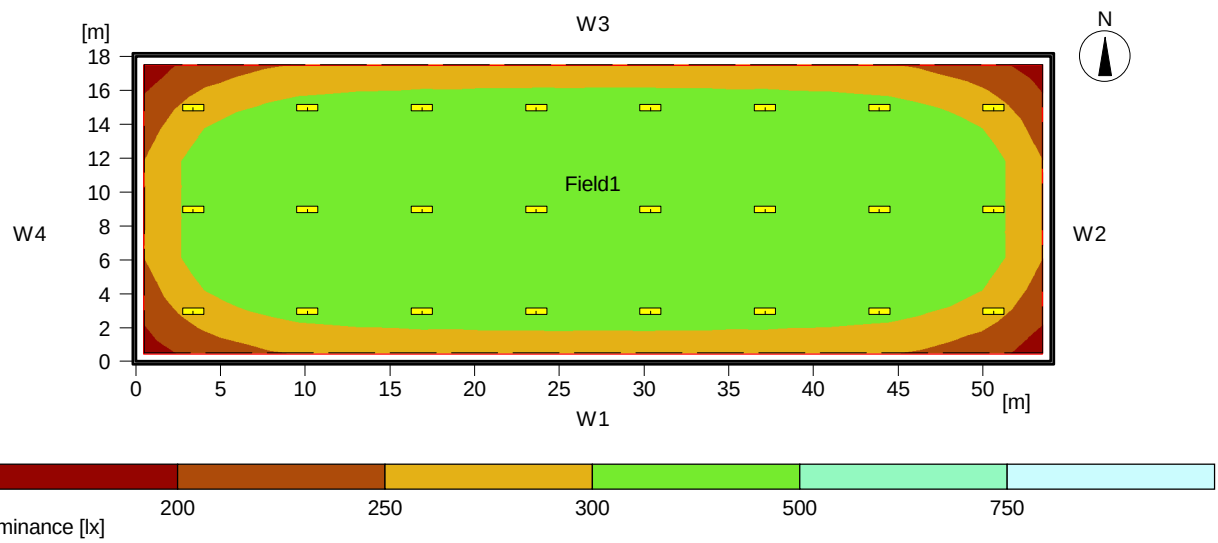
# Result overview, Reference plane No. 1




**General**

| | |
|---|---|
| Calculation algorithm used | Average indirect fraction |
| Maintenance factor | 0.85 |
| Height of evaluation surface | 0.00 m |
| Height of luminaire plane | 8.00 m |
| Total luminous flux of all lamps | 460800 lm |
| Total power | 5760.0 W |
| Total power per area (972.00 m²) | 5.93 W/m² |

**Illuminance**

| | | |
|---|---|---|
| Average illuminance | Eav | 332 lx |
| Minimum illuminance | Emin | 172 lx |
| Maximum illuminance | Emax | 396 lx |
| Uniformity g1 | Emin/Em | 1:1.92 (0.52) |
| Uniformity g2 | Emin/Emax | 1:2.3 (0.44) |

**Type No.\Make**

1 24 Order No. :
Luminaire name : PROJECT: med dist b
Equipment : 4 x W / 4800 lm

CUSTOMER : C FOLEY
: CITY GRP GLASGOW
:

PROJECT.....: CITY GROUP
PROJECT NO.....: 1
DATE.....: 30.3.06

ENGINEERING : COMPANY NAME E F HAMILTON.
: ADDRESS UNIT 14 SANDYFORD OFFICE PARK.
: CITY/STATE DUBLIN 18

ENGINEER.....: GFH

DIMENSIONS OF ROOM

| | | |
|---|---|---|
| AXIS | X | 5.3000 |
| AXIS | Y | 18.00 |
| HEIGHT | Z | 8.00 |

REFLECTIONFACTORS : CEILING : 50 %
: WALL 1-2-3-4 : 10 10 10 10
: FLOOR : 10 %

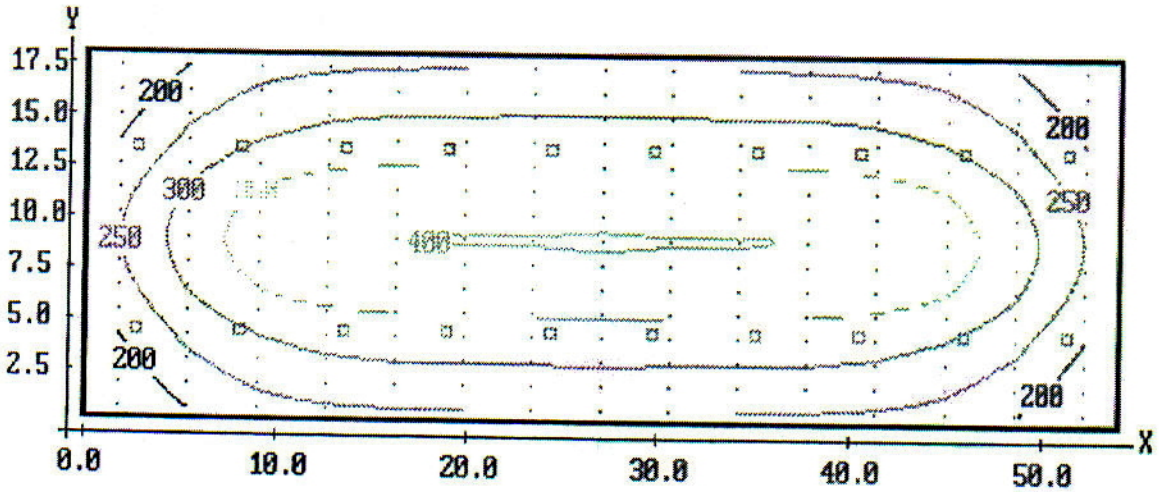
RUNNINGFACTOR : 0.85
CALCULATIONLEVEL Z : 0.00

PHOTOMETRIC DATA

| TYPE OF FITTING | LM PR.LAMP | NO. |
|---|---|---|
| 1. GDH 400 MH R1 0 | 31500 | 20 |

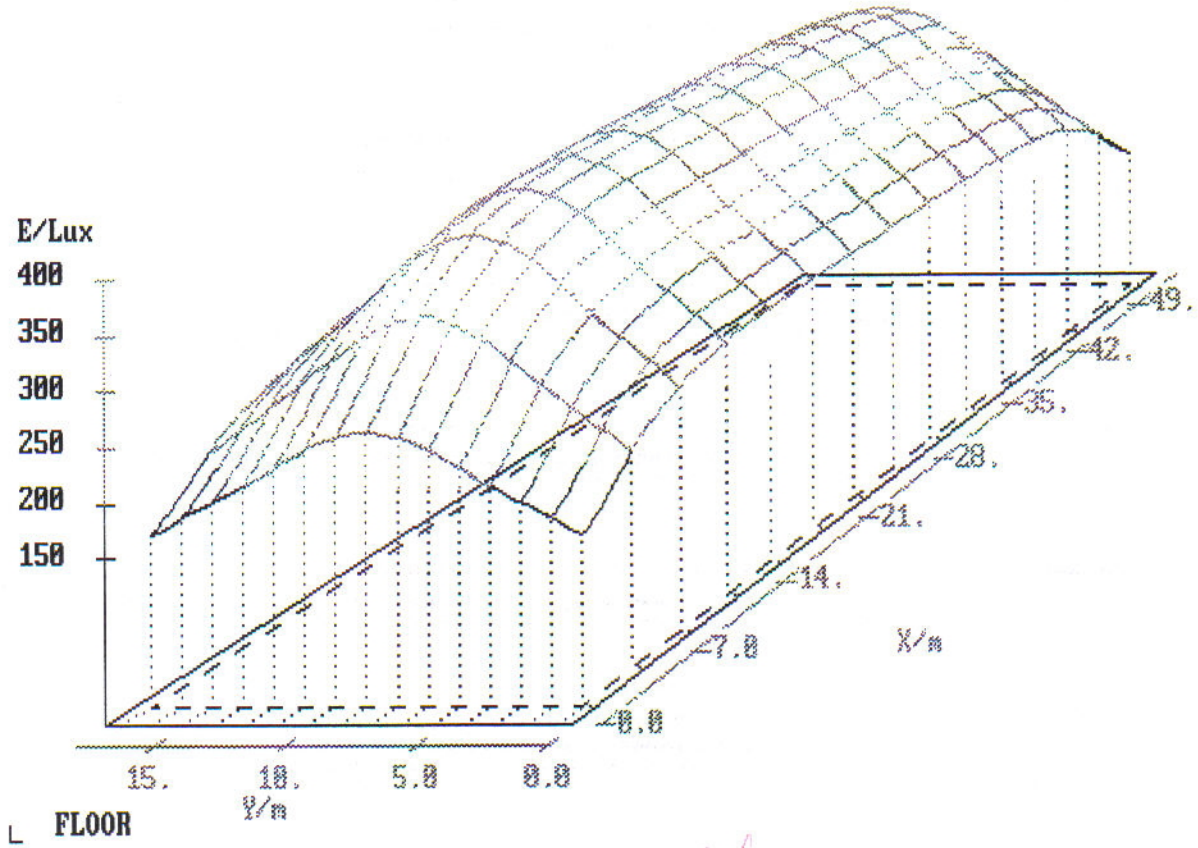
CALCULATIONRESULTS : EMid = 300 LUX EMid/EMax = 0.74 EMin/EMax = 0.39

FLOOR



GLAMOX COMPUTING SYSTEM
DATE : 1990-12- 1
PROJECT : CITY GROUP
PAGE : 6

ILLUMINATION DISTRIBUTION FLOOR



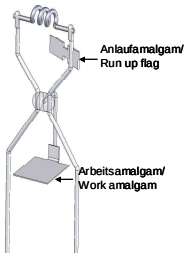

FLOOR

Keith

# DULUX L 55W CONSTANT

**Produt features**:

- **New lamp in amalgam technology.**
- Therefore >90% luminous flux in a wide range from +5℃ to +70℃ ambient temperatu re
- DULUX® L 55 W CONSTANT is only available as a 4-pin lamp suitable for electronic operation
- Operation with QT 1x55, 70/230-240
- Applications:
  exterior lighting, industrial lighting, studio lighting, small fixtures with high temperatures




Preliminary dimensions:

| Description DULUX L CONSTANT | Length l max. mm 1) | Maximum length l Accord. to IEC mm | Base |
|---|---|---|---|
| **55W** | 533 | 535 | 2G11 |

1) Tolerance: -5mm

Preliminary electrical data:

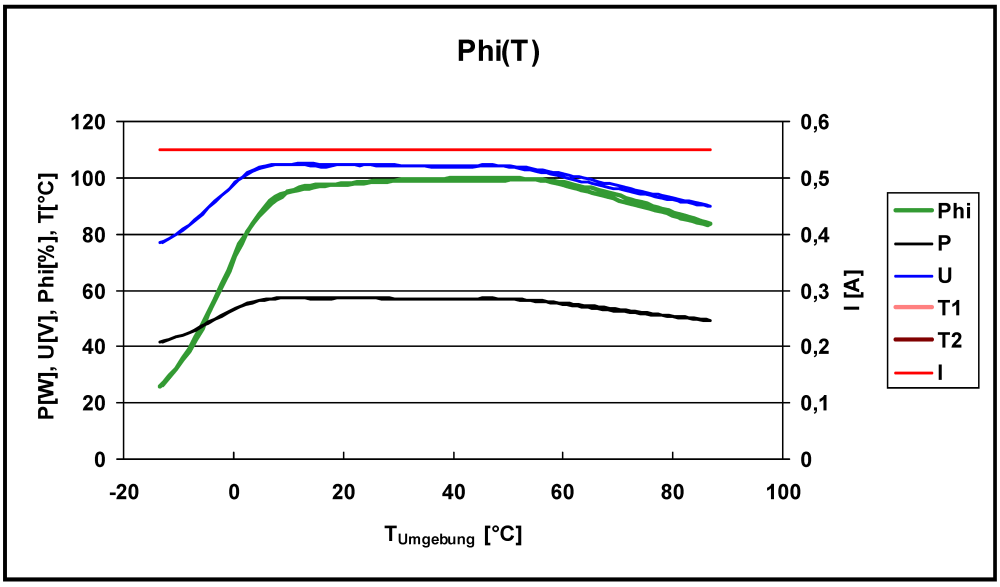
| Description DULUX L CONSTANT | Luminous flux 1) | Lamp wattage | Luminous efficacy | Lamp voltage2) | Lamp current |
|---|---|---|---|---|---|
| **55W** | 4800 | 55 | 87 | 101 | 550 |

1) Nominal luminous flux at 25℃ ambient temperatu re.
2) Tolerance: ± 10V (40/55W), ± 15V (80W)

Photometric data:

| Description DULUX L CONSTANT | Light colours | Colour rendering CRI (accord to DIN 5035) | Illuminance cd/cm² |
|---|---|---|---|
| **55W** | 840 LUMILUX® Cool white | Ra ≥ 80 (1B) | 3,2 |

**Relative luminous flux Phi, lamp voltage U, Lamp current I and Lamp wattag P versus temperature**:
(horizontal burning position, current controlled with 550 mA/25kHz






OSRAM

# DULUX L 55W CONSTANT

**Maximum temperature**:

***Very high temperatures can appear to glass pipe and base in the fixtures. Therefore must pay special attention to the light construction.***

***Following limit temperatures under most unfavourable installation conditions (i.e. fixtures, increased room temperature) should not be exceeded:***

Measuring point 1: 140℃ max.
Measuring point 1 is located 12 mm from the reference plane, in the direction of the glass tube.
Measuring point 2: 100℃ max. on the cold spot


**Circuits**:

System data

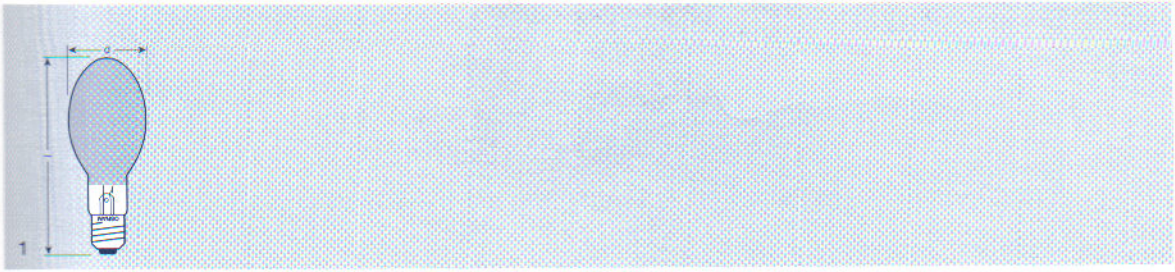
| Lamp<br>DULUX L 55 W CONSTANT | ECG | Luminous flux<br>lm | System wattage<br>W | System luminous efficacy<br>lm/W |
|---|---|---|---|---|
| 55W | QT 1x55, 70/230-240 | 4800 | 61 | 79 |
| 2x 55W | QT 2x55, 70/230-240 | 2x 4800 | 121 | 79 |

| Lamp<br>DULUX L 55 W CONSTANT | ECG | Temperature range min./max.<br>℃ |
|---|---|---|
| 55W | QT 1x55, 70/230-240 | -25...+50 |
| 2x 55W | QT 2x55, 70/230-240 | -25...+50 |

Geometrical data ECG

| Length<br>mm | Width<br>mm | Heigth<br>mm | Distance between holes<br>mm |
|---|---|---|---|
| 360 | 30 | 30 | 350 |
| 423 | 30 | 30 | 415 |

# POWERSTAR® HQI®




**HQI 400 W**

| | | D | | | |
|---|---|---|---|---|---|
| | | E coated | E coated | E/P coated | E/P coated |
| **Type** | | **NAV-VG** | **HQI-VG** | **NAV-VG** | **HQI-VG** |
| ILCOS | | ME-400/59/1A-H 130/S-E40-120/290 | ME-400/59/1A-H 110/S-E40-120/290 | MES-400/45/1A-H 110/S-E40-120/290 | MES-400/45/1A-H 115/S-E40-120/290 |
| Lamp wattage | W | 460 | 400 | 400 | 400 |
| Lamp voltage | V | 130 | 110 | 110 | 115 |
| Ignition voltage min./max. | kVs | 3/4.5 | 3/4.5 | 3/4.5 | 3/4.5 |
| Lamp current | A | 3.8 | 3.6 | 3.8 | 3.5 |
| Nominal luminous flux | lm | 30000 | 26000 | 27000 | 23000 |
| Luminous efficacy | lm/W | 76 | 72 | 68 | 67 |
| Average luminance | cd/cm² | 17 | 10 | – | – |
| Light colour/Colour appearance | | D | D | D | D |
| Colour temperature | K | 5900 | 5800 | 4500 | 5000 |
| Colour rendering index | $R_a$ | 90 | 90 | 90 | 90 |
| NIOSH | h | > 18 | > 18 | > 79 | > 79 |
| ACGIH UV output | mW | < 0.46 | < 0.46 | < 0.11 | < 0.11 |
| Base | | E40 | E40 | E40 | E40 |
| Diameter d | mm | 120 | 120 | 120 | 120 |
| Length max. l | mm | 290 | 290 | 290 | 290 |
| LCL a | mm | – | – | – | – |
| Burning position | | universal | universal | universal | universal |
| Average lamp life | h | 12000 | 12000 | 12000 | 12000 |
| Max. perm. outer bulb temp. | °C | 400 | 400 | 400 | 400 |
| Max. perm. base edge temp. | °C | 250 | 250 | 250 | 250 |
| PF corr. cap. at 50 Hz | µF | 45 | 35 | 45 | 35 |
| Lamp reference | | HQI-E 400/D | HQI-E 400/D | HQI-E/P 400/D | HQI-E/P 400/D |
| EAN 4050300 | | 019727 | 019727 | 637433 | 637433 |
| Standard pack | Qty | 12 | 12 | 12 | 12 |
| Figure | No. | 1 | 1 | 1 | 1 |
| Circuit (see page 28) | Fig. no. | 2 | 2 | 2 | 2 |