



Date: 25-May-2007

To: Karl Demming

From: Paul Chretien

Subject: Technical Inspection of BESF DFAC Electrical

Scope:

This inspection covered all electrical items within the BESF camp DFAC. The inspection was performed by KBR and was completed at 1730 hrs on May 25, 2007. Items in this report are based upon visual observations of all non-KBR installed panels--randomly selected appliances and lighting fixtures were opened to visually inspect internal wiring. Currents and voltages were tested at all panel and selected appliances with a digital multimeter. Current readings at panels are with all available equipment running...which represent approximately half of what can be expected to be connected when DFAC is completed and operating.

Areas of Concern:

One of the greatest areas of concern is the use of 'counterfeit wire'—which refers to wire found which has a particular wire size printed on the insulation but actually has smaller, lower-capacity conductors. One sample of wire taken from the DFAC is labeled as 10mm², but physically measures only 6mm². In other cases breakers are the wrong size, wire is too small and correct wiring practices, and/or equipment were not used.

Current Readings (non KBR installed panels):

Panel Name	Rating (A)	Wire Size attached (mm ²)	Line Amperage (A)		
			Line A	Line B	Line C
PB1	100	70	45	25	38
PB2	125	70	33	55	48
PB3	200	120	45	41	28
PB4	200	120	70	42	61
PB5	125	70	80	89	83
FKMDP	400	240	158	148	163

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Issues:

- ❖ **Wire Size**
 - Internal wiring of appliances...wire too small, improperly landed and grounded on all equipment inspected
 - 60A circuit to 2 fryers...10mm² counterfeit wire (6mm²) actual
 - Light circuit on PB3...wire is undersized and breaker undersize for load
 - PB5 main cables are undersized require 120mm² wire
- ❖ **Grounding**
 - First Kuwaiti Installed 400A distribution panel (FKDP) has no ground bus, no ground wire
 - Panels PB1, PB2, PB4, PB5...have no ground wire to main panel
 - Evidence of poor grounds causing over power situations resulting in burnt wires and outlets
 - Grounds need to be verified with a Galvanometer
- ❖ **Amperage**
 - Main panel FKDP Breaker #6 (lift station) oversize needs 50A
 - Main panel FKDP Breaker #4 (PB5) undersize needs 200A
 - Main panel FKDP Breaker #7 (PB2) undersize needs 125 A
 - Main panel FKDP Breaker #5 (PB1) undersize needs 125A
 - PB5 main breaker undersized needs 200A
 - PB1 main breaker undersized needs 125A
 - Light circuit in PB3 is over current rating for its circuit...3 wires landed on 1 breaker
- ❖ **Equipment and Practices**
 - Light ballasts need replacing -- 80 fixtures @ 2ea -- 180 ballasts
 - All reach in coolers have spliced cords
 - Outlets in floor of dining area of DFAC are not suitable for the application...not waterproof, flush mounted or GFCI
 - 100A breakers (2) in PB5 have not been replaced ...should be (2) new 80A breakers installed
 - Light circuit in panel PB2 is over rated amperage for its circuit, needs to be split into 2 circuits, but PB2 is full—1 of the split circuits must be relocated to PB1
 - Boxes under building have no fittings installed

Electrical Assessment for BESF DEFAC as noted by Electrical Department

Panel 1 Dining Area

100 ampere main: this panel is overloaded!
12 window unit AC's @ 10 amp each
33 ampere lighting load on two 15 ampere circuits
Additional load: two coolers and receptacles

Panel 2 Serving/Dining Area

Will need load tested when all appliance are in place and in use

Panel 3 Kitchen Equipment

1. Deep Fat Fryer Circuits 1, 3, and 5: cable needs to be changed from 10mm cable to 16mm cable: 33KW nameplate reading
2. Griddle top # 1 Circuits 7, 9, and 11: downsize three pole 40 ampere breaker to 30 ampere in order to protect the 6mm cable in use
3. Boiling Pan Circuits 8, 10, and 12: Existing breaker "three pole 30 ampere breaker" and cable are too small; change to 3 pole 40 ampere breaker with 10mm cable

Panel 4

1. Deep Fat Fryer Circuits 1, 3, 5: cable needs to be changed from 10mm cable to 16mm cable: 33KW nameplate reading
2. Electric Range # 1 Circuits 7, 9, and 11: three pole 40 ampere breaker is sufficient: 6mm cable needs changed to 10mm cable: nameplate rating 40 amperes 19KW
3. Electric Range # 2 Circuits 13, 15, and 17: three pole 40 ampere breaker is sufficient: 6mm cable needs changed to 10mm cable: nameplate rating 40 amperes 19KW
4. Tilting Brat Pan Circuits 2, 4, and 6: nameplate 12 KW (22 amperes) 4mm cable is borderline ok; recommend increasing to 6mm cable for NEC or continuous (3 hour) use
5. Boiling Pan Circuits 8, 10, and 12: nameplate 19 KW (32 amperes) 4mm cable needs changed to 6mm cable

Panel 5 Back Kitchen

1. Convection oven # 1 circuits 2, 4, and 6: change 3 pole 40 ampere breaker and 6mm cable to 3 pole 80 ampere breaker and 25mm cable
2. Convection oven # 2: same as above

This report is our Fast Track Electrical Assessment of the BESF DEFAC electrical system and noted. In addition to the deficiencies noted; we also

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found no grounding system in place. We highly recommend a further investigation to verify the presence on a grounding system.

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