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Date: 24/02/06
Ref: **Pharma-2402006**

PHARMA PLANT ERECTION

Compliance with recommendations

I. SCOPE OF SURVEY

The Insured:	**Pharma**
Report No.:	**Pharma-2402006**
Reference:	EAR report regarding erection of a Pharma project.
Scope of Survey:	Reviewing the Compliance with recommendations
Surveyor:	Dan Arbel.
Visit Time:	**26/01/06**

II. INTRODUCTION

The EAR report sets forth several recommendations to improve the operating risk after the completion of the erection.

This report followed the underwriters' request to inspect the Pharma plant and to review the extent of compliance with the recommendations in the original report.

When requesting the visit, we were asked by Plant to provide a list of subjects we would like to review.

The questioner set in motion several meetings and tests, particularly smoke release systems. Several problems surfaced (such as "too high vacuum") and work to solve these problems was done.

In 26/01/06 we visited the plant, met with the Plant project manager and Fire Consultant

Since, the Pharma building is adjacent to the Finished Goods building and there are communication passages between the two buildings, we extended our inspection to the interface between the buildings.

In addition, both buildings are protected by sprinkler systems fed by water tank and fire pump located in the Storage building; we further extended our interest to this system.

Following the visit, we request some documents that were sent to us.

We may now summarize our activity as follows.

III. COMPLIANCE WITH RECOMMENDATIONS

In the following table we present a short description of the recommendations and next to each we define the extent of compliance.

Subject	**Suggested Requirement**	**Compliance**
Construction:	Fire resistant frame, ceilings, shafts walls including the WIP automatic storage that extends from the basement to the top floor.	Complied With
Wall Facing:	Insulated sandwich panels in northern & eastern sides from level 0.00 and on the southern side from level +19.00 m. Otherwise, pre-cast elements will be installed.	Complied with
Insulated Sandwich Panels:	The mineral core panels are fire resistant, but their installation is more difficult. The PUR core is combustible. If the latter prevails we recommend FM approved or LPCB approved panels as per LPS 1208, rating 30 min. It should be noted that the internal facing will be made with Gypsum boards providing additional 15 min. fire rating that is in line with Israeli Standard 921.	Complied with LPS 1181:2003 with fire integrity exceeding 60min and Fire insulation exceeding 16 min. A Gypsum board was also installed in the internal side.
	An important feature is not to allow a continuous insulation core.	Complied with
	Notwithstanding the possibility of using PUR panels, It should further be noted that the fire loading within the building will not exceed "ordinary hazard rating and it will be fully protected by automatic sprinklers.	Complied with

Compliance, Cont'd.

Subject	Suggested Requirement	Compliance
Insulated Sandwich Panels, Cont-ed,	Nevertheless we would advise that **PUR panels should not be installed on the southern wall** above the roof level of the storage building as this area is exposed to fire in the storage building with potential severe consequences if the fire protection system in the storage building fails.	Not complied with. PUR panels were installed above the roof level of the Storage Building.
Fire Loading:	We have been advised that there are no flammable liquids in the building. The fire load stems from the use of plastic containers and packaging materials. See remarks regarding the WIP automatic storage system.	Complied with.
The WIP automatic storage system:	The automatic storage extending from -4.0 to +20.0 is the main fire risk in the buildings.	It is protected by in-Rack sprinkler system every other rack level. The design hazard is Class IV. Since the materials will be stored in plastic boxes within closed metal boxes, the hazard will be very low.
Passive Fire protection:	Each floor is defined as a separate fire risk area. The shafts will be likewise separated. The WIP shaft is enclosed with 2 hours rated walls and automatic fire shutters.	Complied with.
Fixed Fire Protection:	Automatic sprinkler systems as per NFPA-13 will be installed throughout.	Installed and approved by the authorized lab and by FMglobal.
Hoses and Hydrants:	Fire positions next to each exit.	Complied with
Smoke detection:	In most areas. We recommend consulting NFPA-318 i.r.o. Clean Rooms, i.e. very high sensitivity air-sampling system to get continuous sampling at the outlets ducts of the return or exhaust air. Air is supplied via Hepa filters in the suspended ceiling.	Point type smoke detectors installed. High Sensitivity smoke detection not installed. The detectors installed are Hochiki (Japan) and the FACP, Silentnight (US).

Compliance, Cont'd.

Smoke Removal:	The basic idea is to use the exhaust air ducts for the smoke release. The fire rated fans are rate for 8 times the space volume per hour.	Extensive system was installed.
	The concept is to create vacuum in the smoke space by operating the exhaust fan and to pressurize the other spaces by the normal fresh air supply fans. All the fans are connected to the emergency generator by fire rated cables.	Complied with.
	The design should follow NFPA 92A, *Recommended Practice for Smoke-Control Systems*.	Suction was apparently too strong (Fans larger then necessary). Relief dampers were installed to prevent too high vacuum.
Egress:	There are 4 protected staircases. According to existing code the maximum length exit access to protected exit-way is 25 m. It may change to 50m subject to the provision of automatic sprinklers and smoke control system.	?

ADDITIONAL INFORMATION:

1. **Fire Doors in the Passages between the Storage building and the Pharma building:**

   McKeon auto-set fire doors were installed in the passages. These are UL listed and FM approved shutters. They are installed in the passage side (one-side). The fire integrity rating is ……

   The door is equipped with fusible link that with set closure in motion. It will also closed upon tripping of the electrical supply.

   The reliance on the fusible link is not sufficient. The insured should install automatic closure based on smoke detector installed in the corridor and on the operation of the automatic sprinkler system on either side as monitored by the Fire Alarm Control Panel.

   In addition to the Fire Shutter, an automatic screen closes the passage. The screen may prevent smoke passage although it is not design for it.

   Assessment of the passage: We would have preferred two parallel fire stutters installed. However we did not get into these detailed to begin with.

2. **separation:**

   In view of the separation details the Pharma building could not be defined as separated from the storage building.

Compliance, Cont'd.

3. Water Supply:

There is a 600m^3 water reservoir and a 1,500gpm @ 140psi UL/FM listed diesel pump installed in an underground room.

Within there is there is also a diesel generator.

We noted there is some storage in the area. The whole area is protected by automatic sprinklers.

There is a submergible drainage pump for the event of flooding.

We expressed concern about the following:

a. Diesel engines need air. The air supply arrangement is not clear. What we observed is an air grill and right next to it an exhaust fan design to remove smoke.

We were advised that our question was referred to Taro's AC consultant.

b. Fire Load in the area: The diesel pump is supposed to supply water to fight fire in the very area. Not only smoke and steam might be sucked by the diesel engine, but the water has to be removed by a too small a pump.

It would be best to remove the fire load from this area altogether.

Insured Response: All combustible materials will be removed from the site.

c. Drainage of the Water: The pump seems to us too small. We would require evaluation of the drainage need. Meanwhile installed flood detector as a further alerting feature (the water level in the reservoir is monitored).

d. Reservoir Capacity: It is said that it has a net capacity of 600m^3. We would like to get a drawing to ascertain that.

4. Status:

The building is only partly occupied.

Yours faithfully,

Dan Arbel

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