

# Fire Load Assessment and Protection Measures in Auto Component Industry

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**Abstract**— In the last few years auto-components industry has experienced healthy growth. The rapidly globalizing world is opening up newer avenues for the transportation industry, especially while it makes a shift towards electronic, electric, and hybrid cars, which are deemed more safe, efficient, and reliable modes of transportation. The fuels that are prevalent throughout the automotive industry, including Electrical components, petrol, solvents, paints, and engine oils, are highly flammable and present the most immediate and obvious fire hazard on these premises. Availability of fire protection systems is not the only solution for fire until they are adequate. Fire load assessment provides information about fire risk and its control measures. In this dissertation, the systematic method has been adopted for the assessment of fire load which will help us to assess the adequacy of an existing fire protection system for automobile systems. This dissertation enables how fire protection system is correlated with the combustible material & its calorific value. Most of the companies have their own fire protection system but they are really adequate, it really needs to be assessed.

**Keywords:** Auto-Component Industry, Fire Hazard, Fire Load Assessment, Fire Protection System

## I. INTRODUCTION

SANOH India Private Limited has set up a plant to manufacture Single Wall / Double walled Copper Brazed /Welded Steel Tubes and Tubular Components at Dewas, district Dewas. These tubes/components are generally used in refrigerators, automobiles etc. These tubes are manufactured in different sizes, as per the requirement of the customer.

Sanoh Industrial Co. Ltd. has traveled a long journey along the path of diversification. Always embracing diversity, we raise our antennas high and wide to anticipate future trends, guided by our basic philosophy of responding to market needs in the current era while generating fresh demand for the new era. With a global manufacturing network that spans 91 locations in 22 countries, Sanoh promotes autonomy at each facility from development to production. At the same time, our domestic facilities proudly employ personnel from 22 countries, from whom we gain a constant stream of fresh perspectives and valuable market intelligence. Today's markets are changing on many fronts. In the aftermath of the financial crisis of 2008, uncertainty has mounted on the international political and business scenes. In the automotive sector, demand intensifies year by year for systems that reduce environmental impact and prevent accidents, driving astonishingly rapid innovations in electronic controls, autonomous driving and other advanced technologies. To respond to these rapid changes, Sanoh has been establishing R&D outposts in the United States, Europe and other overseas locations. By forming a global network for

marketing and development, Sanoh is accelerating its activities in advanced technology development.

In spite of best design and layout of plant, safe operating procedures and various preventive measures the possibility of a Fire emergency cannot be totally ruled out. During this event timely and organized action must be taken to control the situation and to minimize the damage or loss to the factory, human beings and environment. Hence SANOH has taken an initiative to conduct Fire Load Assessment and detailed assessment about adequacy of existing fire protection system.

### A. Objective

The main objective of this paper is to

- 1) Assessment of Fire Load.
- 2) Exact Requirement of Fire Water Reservoir Tank
- 3) Need fire flow requirement in existing area of application
- 4) Adequacy of existing Fire Protection System

## II. SYSTEM DOMAIN

### A. Introduction

SANOH INDIA PRIVATE LIMITED has set up a plant to manufacture Single Wall / Double walled Copper Brazed /Welded Steel Tubes and Tubular Components at Dewas, district Dewas. These tubes/components are generally used in refrigerators, automobiles etc., These tubes are manufactured in different sizes, as per the requirement of the customer.



Fig. 2.1: Process Elements of SANOH

### B. Copper Plating Plant

Mild steel strips in thickness of 0.25mm to 0.65 mm are copper plated by an automatic Electrolytic copper plating plant. These strips are put on an uncoiler wherefrom it enters into an alkaline degreasing and pickling bath where it is ensured that the strip is totally free from oil and dust. From this, the strip is conveyed into various copper coating baths where cyanide electrolytes are kept and DC current is supplied through rectifiers. The amount of coating is controlled by the speed of strip as well as regulating current from rectifiers. The entire electrolytes are being wiped out by pressure squeezing roll system. The strip is then put into the rinsing tank where continuous water is flowing to ascertain that the strip is totally free from any loose material.

After this the strip is passed to Hot Air Dryer where the strip is totally dried. It is again wound on a recoiled.

### C. Galvanising Plant

After making the Tubes, a portion of the same goes for galvanizing for corrosion resistance purpose. Galvanizing is done by a continuous Electro-galvanizing plant. The tubes in coil form are passed through a straightening section first, where the entire tubes get straightened to a reasonable accuracy and then passed to various tanks which contain different electrolytes. The DC current is supplied to the electrolytes by rectifiers system which is controllable. The amount of current to be supplied depends upon the coating thickness which is required on the tubes. From galvanizing bath, the tubes goes to the water rinsing the cleaning section, where electrolytes along with the tube is totally wiped out and the continuous supply of air is given to the tubes to make it dry. From this cleaning section the tubes are passed through passivation either yellow or olive green depending their requirement. The tubes then passed to uncoiling section and air drying system. After ensuring complete wipe out of the water, the tubes will be wound. The entire plant runs on the Principle of good manufacturing process.

### D. PVDF Plant

The double wall / Single wall tube is being produced by rolling of copper coated mild steel strip and getting copper brazing / welding all-around. This is done by resistance heating process.

Then tube having passed through nondestructive testing machine for testing of its brazing quality it passes through leak testing for leakage checking. After that these tube in coil form passed through swaging m/c where both end will swaged. After that tube is passed through electro degreases process where tube is cleaned by electrolytic cleaning, these tubes passes through electro pickling where tubes are again cleaned and activated for plating purpose in sulphuric acid solution. After electro degreasing & acid pickling, these tubes shall be processed through electro galvanizing (3- 10 tanks) containing zinc sulfate solution (as electrolyte) where zinc is deposited on the tube surface. The thickness achieved is 13 to 25 micron. After that tubes passes through required Chrome free passivation, then through hot air drying system in on line for drying of tube. Chrome free passivation tube will be passed in PVDF line coating for PVDF coating purpose.

### E. Tube Making Plant

The predetermined strip width and thickness of a particular size is fed into the forming section of the tube mill, where it is converted into Double Walled Round Tubes. In the forming section, in the last pass, an insertion known as mandrel is put by which the ID of the Tube is controlled. The mandrel is lubricated by special lubricants which leaves no impurities after brazing. The tube then passed through a brazing furnace where controlled atmosphere is maintained. The furnace is electrically heated where we can get the controlled amount of current to be passed. This depends upon mainly the speed of the strip and thickness of the brazing is to be done. The brazed tubes then passed through cooling tunnel and from there to cooling section. The output will be

Copper brazed Mild Steel Tubes of 4.75 to 10.00 mm diameter in coil form having a length of 1500 meters.



Fig. 2.2: Copper Plating Plant



Fig. 2.3: Galvanizing Plant



Fig. 2.4: PVDF Plant

### F. Effluent Treatment Plant

There are 3 streams which is treatment in common ETP facility having R.O. and Evaporator system.

- 1) Copper plating plant
- 2) Galvanizing plant
- 3) Zinc plating cum PVDF plant

#### 1) Copper plating plant :-

Copper plating having cyanide content effluent and it is being treated with hydrogen peroxide chemical for oxidation of complex cyanide effluent. After proper treatment of effluent it is going to new modern common effluent treatment plant.

#### 2) Galvanizing plant :-

Galvanizing plant having Hexa – Valent chrome content effluent and it is being treated with Sodium Meta bisulphate chemical for proper conversion of hexavalent chrome ( Cr+6 ) to Tri valent chrome ( Cr+3 ) effluent. After proper treatment of effluent it is going to new modern common effluent treatment plant.

3) *Zinc plating cum PVDF plant -:*

Acidic effluent of process plant is being treated by Sodium hydroxide. Where PH maintain 8.5 after proper treatment of effluent, effluent pass clarifier, Ultra filter and Double stage R.O. system. R.O. permeate water is using in process plant and its rejected processed in evaporator system..

G. *Hydrogen Plant*

The Hydrogen gas is being produced by electrolysis diffusion of water under the controlled safety measures as laid down under Explosive Act. The Hydrogen is being stored in water sealed holders and being supplied to the tube mills with adequate safety arrangements. The H<sub>2</sub> generation & utilization process is also monitored and followed by the instructions as laid down in the MP Factories rules 1962.

H. *Warehouse*

Warehouse is a section or block where all raw and finished materials are stored in segregated manner. Warehouse is an area in plant where fire risk may occur due to handling and storage of various flammable and combustible materials.

III. METHODOLOGY

Fire Load Assessment and Protection Measures shall be done as per below methodology. Fire Load shall be determined as per National Building Code of India- Calorific energy, of the whole contents contained in a space, including the facings of the walls, partitions, floors and ceilings and then divided by floor area.

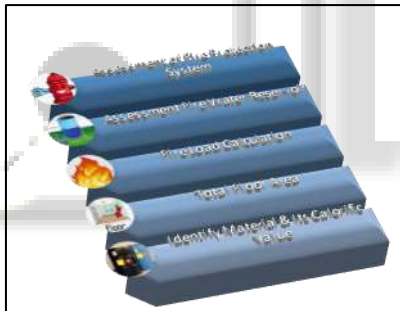


Fig. 3.1: Process for Fire Load Assessment & Protection Measures

1) *Step-1- Identify Material & Its Calorific Value*

First of all type of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

2) *Step-2- Total Floor Area*

After evaluating the fuel details, total floor area to be measured based on the floor wise and area wise in square meter.

3) *Step-3- Fire Load Calculation*

Fire load shall be assessed by below formula for entire location or particular area of the plant.

$$= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}}$$

4) *Step-4- Assessment Fire Water Reservoir*

Fire water reservoir capacity can be assessed based on the calorific value and nature of risk of industry as per below table 3.1.

Sr. No.	Fire Load	Nature of Risk	Capacity of Static Storage Exclusively
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	kcal per m <sup>2</sup>		Reserved For Hydrant Service.
1.	Up to 275000	Light hazard	Not less than 01 hour's aggregate pumping capacity with a minimum of 135000 liters.
2.	275000 to 550000	Moderate hazard	Not less than 2 hour's aggregate pumping capacity.
3.	550000 to 1100000	High hazard (A)	Not less than 3 hour's aggregate pumping capacity.
4.	Above 1100000	High hazard (B)	Not less than 4 hour's aggregate pumping capacity.

Table 3.1: Fire Water Reservoir Capacity

5) *Step-5- Assessment of Fire Protection System*

Fire Protection Assessment includes pumping capacity of fire pump, delivery pressure of fire pump shall be based on the calorific value and nature of risk of industry as per below table 3.2

Sr. No.	Fire Load kcal per m <sup>2</sup>	Nature of Risk	Pumping Capacity LPS (M3/Hr)	Delivery Pressure At Pump Discharge (Kg/Cm <sup>2</sup> )
1.	Up to 275000	Light hazard	38(137)	7
2.	275000 to 550000	Moderate hazard	47(171)	7
3.	550000 to 1100000	High hazard (A)	76(273)	7/8.8
4.	Above 1100000	High hazard (B)	Two of 76(273)	7/8.8

Table 3.2; Fire Protection System

IV. ANALYSIS AND DISCUSSION

A. *Fire Load Assessment and Protection Measures*

Study has been conducted for one of the largest Automotive Ancillary company SANOH India Pvt. Ltd. Sanoh India Pvt. Ltd. has set up a plant to manufacture Single Wall / Double walled Copper Brazed /Welded Steel Tubes and Tubular Components at Dewas, district Dewas. These tubes/components are generally used in refrigerators, automobiles etc., these tubes are manufactured in different sizes, as per the requirement of the customer.

There are multiple units are located in Dewas plant of SANOH as mentioned in system domain. Fire load assessment shall be done for each plant or area where there is probability to have fire hazard. After that fire load shall be calculated for entire plant to design the appropriated fire protection system and comparison with existing system.

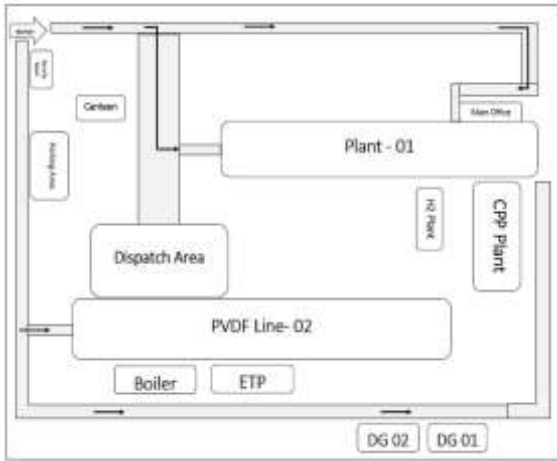


Fig. 4.1: Plant Layout for SANOH

Sr. No.	Name of Area
1.	Copper Plating Plant
2.	Tube Plant
3.	Galvanizing Plant
4.	PVDF Plant
5.	ETP
6.	Hydrogen Plant
7.	Warehouse
8.	Canteen
9.	Project & Water Cooler
10.	Parking Area
11.	Dispatch Area
12.	DG Set
13.	Misc. Area

Table 4.1; Plant Area for SANOH

**B. Fire Load Assessment for Copper Plating Plant**

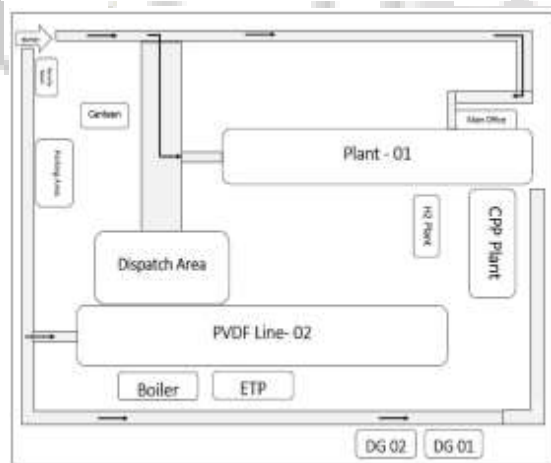


Fig. 4.2: Plant Layout for Copper Plant

Sr. No.	Name of Material	Calorific Value Kcal (C)	Quantity in Kg (Q)	Total Q x C
1.	Paint	4650	500	2325000
2.	Thinner	11100	2000	22200000
3.	Resin	4670	400	1868000
4.	Carton Box	4036	100	403600
5.	Polythene Bag	4180	50	209000

6.	Wooden Pallets	4442	500	2221000
7.	Total			46038606

Table 4.2: Materials for Copper Plant

Step-1- Identify Material & Its Calorific Value

First of all type of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of copper plant is 2629.3 square meter inclusive of all floors.

Step-3- Fire Load Calculation

Fire load for copper plant

$$= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}}$$

$$= \frac{46038606}{2629.3}$$

Fire Load for Copper plant = 17509.8 kcal per m<sup>2</sup>

**C. Fire Load Assessment for Tube Plant**

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of tube plant is 3770.3square meter inclusive of all floors.

Step-3- Fire Load Calculation

Fire load for tube plant

$$= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}}$$

$$= \frac{59791600}{3770.3}$$

Fire Load for Tube plant is 15858.5 kcal per m<sup>2</sup>

**D. Fire Load Assessment for Galvanizing Plant**

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of Galvanizing Plant is 500square meter inclusive of all floors.

Step-3- Fire Load Calculation

Fire load for Galvanizing Plant

$$= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}}$$

$$= \frac{33853400}{500}$$

$$= 67706.8 \text{ kcal per m}^2$$

**E. Fire Load Assessment for PVDF Plant**

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of PVDF Plant is 5990.4 square meter inclusive of all floors.

Step-3- Fire Load Calculation

$$\begin{aligned} &\text{Fire load for PVDF Plant} \\ &= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}} \\ &= \frac{286187528}{5990.4} \end{aligned}$$

Fire Load for PVDF Plant is **47774.3** kcal per m<sup>2</sup>

*F. Fire Load Assessment for ETP Plant*

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of ETP Plant is 1010 square meter inclusive of all floors.

Step-3- Fire Load Calculation

$$\begin{aligned} &\text{Fire load for ETP Plant} \\ &= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}} \\ &= \frac{30270000}{1010} \end{aligned}$$

Fire Load for ETP Plant is **29970.2** kcal per m<sup>2</sup>

*G. Fire Load Assessment for Hydrogen Plant*

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Total floor area of Hydrogen Plant is 323 square meter inclusive of all floors.

Step-3- Fire Load Calculation

$$\begin{aligned} &\text{Fire load for Hydrogen Plant} \\ &= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}} \\ &= \frac{220048111}{323} \end{aligned}$$

Fire Load for Hydrogen Plant is **681263.50**kcal per m<sup>2</sup>

*H. Fire Load Assessment for Warehouse*

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of Warehouse is 1390 square meter inclusive of all floors.

Step-3- Fire Load Calculation

$$\begin{aligned} &\text{Fire load for Warehouse} \\ &= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}} \\ &= \frac{76443128}{1390} \end{aligned}$$

Fire Load for Warehouse is **54995** kcal per m<sup>2</sup>

*I. Fire Load Assessment for Canteen*

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of Canteen is 306 square meter inclusive of all floors.

Step-3- Fire Load Calculation

$$\begin{aligned} &\text{Fire load for Canteen} \\ &= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}} \\ &= \frac{7474500}{306} \\ &= \mathbf{24426.4} \text{ kcal per m}^2 \end{aligned}$$

*J. Fire Load Assessment for Project Area*

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of Project Area is 583 square meter inclusive of all floors.

Step-3- Fire Load Calculation

$$\begin{aligned} &\text{Fire load for Project Area} \\ &= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}} \\ &= \frac{29689400}{583} \\ &= \mathbf{50925.2} \text{ kcal per m}^2 \end{aligned}$$

*K. Fire Load Assessment for Parking Area*

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of Parking Area is 306 square meter inclusive of all floors.

Step-3- Fire Load Calculation

$$\begin{aligned} &\text{Fire load for Parking Area} \\ &= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}} \\ &= \frac{5600000}{322} \\ &= \mathbf{17391.3} \text{ kcal per m}^2 \end{aligned}$$

*L. Fire Load Assessment for Dispatch Area*

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of Dispatch Area is 851 square meter inclusive of all floors.

Step-3- Fire Load Calculation

$$\begin{aligned} &\text{Fire load for Dispatch Area} \\ &= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}} \\ &= \frac{7460400}{851} \\ &= \mathbf{8766.6} \text{ kcal per m}^2 \end{aligned}$$

**M. Fire Load Assessment for DG Set Area**

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of Hydrogen Plant is 216 square meter inclusive of all floors.

Step-3- Fire Load Calculation

Fire load for Hydrogen Plant

$$= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}}$$

$$= \frac{8392800}{216}$$

$$= 38855.5 \text{ kcal per m}^2$$

**N. Fire Load Assessment for Miscellaneous Area**

Step-1- Identify Material & Its Calorific Value

Types of fuel and its quantity to be identified and then its calorific value can be obtained from Annexure of National building code of India Part-4.

Step-2- Total Floor Area

Total floor area of Miscellaneous Area is 1390 square meter inclusive of all floors.

Step-3- Fire Load Calculation

Fire load for Miscellaneous Area

$$= \frac{\text{Total Quantity of Fuel in kg} \times \text{Calorific Value of Fuel in kcal}}{\text{Total floor area in square meter}}$$

$$= \frac{76443128}{1390}$$

$$= 54995 \text{ kcal per m}^2$$

Sr. No.	Department	Fuel with Calorific Value	Area	Fire Load
1.	Copper Plant	46038606	2629.3	17509.8
2.	Tube Plant	59791600	3770.3	15858.5
3.	Galvanizing Plant	33853400	500	67706.8
4.	PVDF Plant	286187528	5990.4	47774.3
5.	ETP Plant	30270000	1010	29970.2
6.	Hydrogen Plant	220048111	323	681263.50
7.	Warehouse	76443128	1390	54995
8.	Canteen	7474500	306	24426.4
9.	Project Area	29689400	583	50925.2
10.	Parking Area	5600000	322	17391.3
11.	Dispatch Area	7460400	851	8766.6
12.	DG Set Area	8392800	216	38855.5
13.	Miscellaneous Area	76443128	1390	54995
	Total	887692601	19281	46039.7

Table 4.3 : Summarize Calculation for Fire Load of SANOH Plant

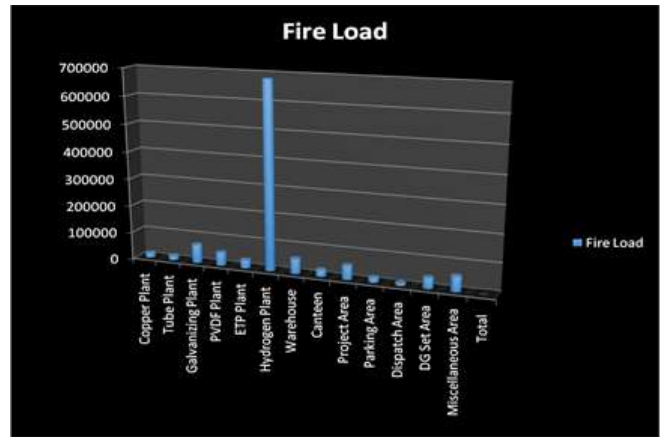


Fig. 4.3: Fire Load for SANOH Plant

**O. Assessment Fire Water Reservoir**

As Fire Load for SANOH industry is 46039.7 kcal / m<sup>2</sup> Hence Fire water reservoir capacity shall be based on as per below table.

Sr. No.	Fire Load kcal per m <sup>2</sup>	Nature of Risk	Capacity of Static Storage Exclusively Reserved For Hydrant Service.
1.	Up to 275000	Light hazard	Not less than 01 hour's aggregate pumping capacity with a minimum of 135000 liters.
2.	275000 to 550000	Moderate hazard	Not less than 2 hour's aggregate pumping capacity.
3.	550000 to 1100000	High hazard (A)	Not less than 3 hour's aggregate pumping capacity.
4.	Above 1100000	High hazard (B)	Not less than 4 hour's aggregate pumping capacity.

Table 4.4: Fire Water Reservoir Capacity for SANOH

**Step-5- Assessment of Fire Protection System**

SANOH industry comes under Light Hazard Category Hence Fire Protection Assessment shall be based on as per below table.

Sr. No.	Fire Load kcal per m <sup>2</sup>	Nature of Risk	Pumping Capacity LPS ( M3/Hr )	Delivery Pressure At Pump Discharge (Kg/Cm <sup>2</sup> )
1.	Up to 275000	Light hazard	38(137)	7
2.	275000 to 550000	Moderate hazard	47(171)	7
3.	550000 to 1100000	High hazard (A)	76(273)	7/8.8
4.	Above 1100000	High hazard (B)	Two of 76(273)	7/8.8

Table 4.5: Fire Protection System for SANOH

V. RESULT AND CONCLUSION

Results for Fire Load Assessment and Protection Measures for SANOH are as follows.

Sr. No.	Particular	Result	Current Status
1.	Fire Load kcal per m <sup>2</sup>	46039.7 kcal / m <sup>2</sup>	46039.7 kcal / m <sup>2</sup>
2.	Nature of Risk	Light Hazard	Light Hazard
3.	Capacity of Static Storage Exclusively Reserved For Hydrant Service.	Not less than 01 hour's aggregate pumping capacity with a minimum of 135000 liters.	1.8 Hour
4.	Fire Water Storage Capacity	135 KL	260 KL
5.	Pumping Capacity LPS ( M <sup>3</sup> /Hr )	38(137)	1 Electrical Driven Pump 38 LPS(137 M <sup>3</sup> /Hr) and one DG Pump 38 LPS (137 M <sup>3</sup> /Hr) and 1 Jockey Pump Jockey Pumps- 10 m <sup>3</sup> /Hr
6.	Delivery Pressure At Pump Discharge (Kg/Cm <sup>2</sup> )	7	7

Table 5.1: Results for Fire Load Assessment and Protection Measure for SANOH

Assessment of existing fire hydrant system has been done on the basis of various Indian standard and fire protection manual by Tariff advisory committee.

Sr. No.	Parameter	Criteria	Current Status	Adequacy
1.	Nature of Risk (Occupancy Hazard)	Light Hazard	Light Hazard	Adequate
2.	Capacity of Static Storage Exclusively Reserved For Hydrant Service.	Not less than 01 hour's aggregate pumping capacity with a minimum of 135000 liters.	1.8 Hour	Adequate
3.	Fire Water Storage Capacity	135 KL	260 KL	Adequate
4.	Pumping Capacity LPS ( M <sup>3</sup> /Hr )	38(137)	1 Electrical Driven Pump 38 LPS(137 M <sup>3</sup> /Hr) and one DG Pump 38 LPS (137 M <sup>3</sup> /Hr) and 1 Jockey Pump Jockey Pumps- 10 m <sup>3</sup> /Hr	Adequate
5.	Delivery Pressure At Pump Discharge (Kg/Cm <sup>2</sup> )	7	7	Adequate
6.	Required pumping capacity for jockey pump in m <sup>3</sup> /hr.	10 m <sup>3</sup> /Hr	1 Jockey Pumps- 10 m <sup>3</sup> /Hr	Adequate
7.	Diameter of main delivery header of pump in mm.	150	150	Adequate
8.	Diameter of main suction header of pump. in mm	200	200	Adequate
9.	Requirement of priming system	Yes	Yes	Adequate
10.	Capacity of priming system	1000 Ltr	1000 Ltr	Adequate
11.	Arrangement of pumping configuration.	To Maintain the pressure 7 bar with alternate pump DG operated and jockey pump for make-up the pressure	Jockey pump- 5.0 kg/cm <sup>2</sup> to -7.0 kg/cm <sup>2</sup> pressure in auto mode. Electrical Pump (1 qty)- When pressure drops below 4.5 kg/cm <sup>2</sup> to start in auto mode. Diesel pump – When pressure drop to below 3.5 kg/cm <sup>2</sup>	Adequate
12.	Storage capacity of diesel 28 Ltr / Hr	2 Hr.	7.14 Hr ( 200 Ltr. Capacity )	Adequate
13.	Dia. of hydrant line main.	150	150	Adequate
14.	Dia. of hydrant post in mm	80	80	Adequate

15.	Dia. of monitor post in mm	100	100	Adequate
16.	Requirement of isolation valve	Yes	Yes	Adequate
17.	Distance between two hydrant in mtr	45	30	Adequate
18.	Total nos.of hydrant point as peripheral is 1460 mtr	32	38	Adequate
19.	Requirement of hose in mtr	7.5 & 15	15 & 15	Adequate
20.	Standard length of hose pipe	7.5 & 15	15	Adequate
21.	Types of branches	Short, Foam, Mayura, Diffuser	Short, Foam, Mayura, Diffuser etc	Adequate

Table 5.2: Assessment of Existing Fire Hydrant System

## VI. CONCLUSION

Fire Load assessment is a proactive approach to analyze the exact requirement of water for firefighting apart from these it is also plays a significant role for managing the fire risk. The automobile and its ancillary industry has significant risk of fire for that reason the quantification of extinguishing media is very essential. However there are various element are involved in fire risk management like evacuation, building design structural load, type of material but fire load and fire hydrant system is now a days is mandatory for each industry

This dissertation presents useful information about Fire Load Assessment and Protection Measures for Automobile Ancillary Company SANOH. There are various combustible and highly flammable materials like hydrogen gas are used in automobile industry. A single spark can easily destroy the entire plant. Automobile ancillary companies consume lot of highly flammable liquid and gas as fuel to operated DG and canteen operation and have greater risk of fire and explosion. Fire Hazard now a day has become the most debatable subject for industrialist. This dissertation systematically examined and quantitatively assessed Fire Load Assessment and Protection Measures for various process operation of SANOH. In this dissertation is has been assessed that how fire can be produced , sources to ignite the fire, area where there is greater chances of fire or fire load is higher at hydrogenation block where special attention needs to be taken. This report will help to the organization and similar Automobile organization to assess electrostatic hazard assessment and preventive measure to reduce its venerable risk. It has also concluded that the existing fire protection system for Dewas plant of SANOH industry has adequate arrangement of Firefighting and system to prevent ignition at their workplace.

## VII. FUTURE SCOPE

In this paper will help us to predict the Fire Load Assessment and Protection Measures Study in Automobile industry which will not only prevent to fire and explosion etc. It is also beneficial to unnecessarily loss of product due to improper housekeeping, people motivation, people development, reduction in work place injury etc. in production area. This dissertation is complete information pack to assess Fire Load Assessment and Protection Measures assessment in all the plant where Combustible material, flammable liquid, flammable gas and chemicals are handled. This report will be

utilized in other industries also where such similar operation and materials are used.

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