

# Ovens-Solvent Evaporating

## Models: PF Stoving & Curing, Solvent Evaporating Ovens, 300 deg C

Most vapour explosions in ovens occur when materials that can absorb large quantities of solvent are being processed; typical examples being coils & similar electrical equipment, fibreboard and textiles. Every flammable solvent has a lower and upper flammable limit, and unless the concentration of the solvent vapour is within this range it will not explode. The range widens, for most solvents, with increasing temperature.

Precautions must be taken to ensure that no substantial volume of vapour/air mixture within the range of flammability can occur in the oven. It is not sufficient to permit an explosive mixture to form and attempt to obtain safety by preventing foreseeable means of ignition. The precautions must be directed towards keeping the concentration of solvent vapour down and this is achieved by permitting only the minimum quantity of solvent to enter the oven and by ventilating the oven continuously in use, to dilute the solvent vapours emitted to one quarter of the lower flammable limit.

The "flash-point" of a substance is the temperature at which it evolves sufficient vapour to form an ignitable mixture with air when tested under standard conditions. Thus, if the flash point of a liquid is below the temperature of the work room it will give off vapour until (and beyond) the point where the whole room is full of a flammable mixture, or until all the liquid has evaporated. If the flash point is higher than room temperature, then the liquid will never give off enough vapour to form a flammable mixture in the room.

Low flash point solvents are thus intrinsically dangerous. However, the choice of a solvent with a high flash point will usually make no difference to the safety of the oven used to evaporate it, since the oven almost inevitably has a working temperature higher than the flash point. It is still most desirable to choose solvents with the highest possible flash points to reduce danger at the dipping, spraying and other processes prior to the oven.

### Pre-Treatment

The first step should be to limit as far as possible the amount of solvent entering the oven at each loading. Particular care is needed with articles which have been dipped in paint or varnish to give a thicker coating than is usually obtained by spraying. As much drying as possible should be carried out before the articles are added into the oven. Where the process permits, it is a good practice, both for safety and economy of heat, to allow the load to remain for a short time in a semi-enclosure provided with mechanical exhaust ventilation, so that air at room temperature can remove some of the solvent. This arrangement also has the advantage that dripping in this oven is reduced, whereby the accumulation of paint and varnish residues in the oven became less of a problem.

### Ventilation

Reliance on natural convection currents up the chimney is not normally an acceptable method of introducing sufficient fresh air into the oven to prevent a solvent/air explosion mixture forming. The oven should be fitted with mechanical exhaust ventilation. It is important that the exhaust draught should be applied at points in the oven where the rate of evaporation is a maximum, and that there are no dead spots in the oven space where there is little air movement, with little dilution of the flammable vapours as a result. In order to improve the temperature distribution and to obtain an even flow of air throughout the oven it is normal to have some form of air recirculation.

A proportion of the vapour and fume laden air should be extracted through a flue fitted with its own separate exhaust fan. Reliance on spillage of sufficient vapour and fume laden air through a rotund draught flue from the recirculation system tends to be unsatisfactory. An interlock between the heat source and the exhaust ventilation is the normal method of ensuring that sufficient air is introduced into the oven for safety.

### Explosion Relief & Door Fastening

Although an oven may be provided with comprehensive precautions, explosions can still occur due to failure of components, inadequate servicing, or deliberate scotching of safety devices. The probability of fatal or serious injury to workpeople, or serious damage to the oven, can be reduced substantially if suitable explosion relief is provided, coupled with adequate securing of the

doors of the oven to prevent their becoming missiles in the event of an explosion.

It is recommended that explosion relief panels are fitted to all solvent evaporating ovens irrespective of chamber volume. These notes cover the bare essentials of the requirements for solvent evaporating ovens used in stoving and curing processes.

## 28 liter, 66 liter, 128 liter, 230 liter, 300 deg C Oven



Model	PF30-SC	PF60-SC	PF120-SC	PF200-SC
<b>Max. Temp (°C)</b>	300	300	300	300
<b>Chamber Dimensions (mm)</b>	(H)	300	400	500
	(W)	292	392	492
	(D)	320	420	520
<b>External Dimensions (mm)</b>	(H)	470	570	670
	(W)	665	765	865
	(D)	470	570	670
<b>Chamber Capacity (Litres)</b>	28	66	128	230
<b>Weight (kg)</b>	30	45	60	75
<b>Shelves</b>				
number supplied	2	2	2	2
max. possible	3	5	9	15
max. dist load/shelf kg	10	10	10	10
max. load kg	20	30	40	50
<b>Performance</b>				
<b>Power Rating at 240V (watts)</b>	1000	1500	2000	2700
<b>Holding Power* at Max. Temp. (watts)</b>	350	600	800	1250
<b>Temp. Stability on/off control (°C)</b>	±1.0	±1.0	±1.0	±1.0
<b>Temp. Stability PID control (°C)</b>	±0.2	±0.2	±0.2	±0.2
<b>Heat Up Times* (mins)</b>	100°C	4.5	4.5	4.5
	200°C	12	12	12
	240V	25	25	25
	300°C	25	25	30
<b>Recovery Times* (mins)</b>	100°C	1	1	1.5
	200°C	2.5	2.5	3
	Door Open 60secs 240V	4	4	4
<b>Air Exchanges vol (l/h) @ 100°C</b>	10,000	10,000	10,000	10,000
<b>Air Exchanges Exchanges/Hour</b>	360	153	79	44