



## Phasing out CTC from PRINTING SECTOR

- Transiting to safer alternatives -

Carbon Tetrachloride (CTC) has been rather popular when it comes to choosing a solvent for removing stains from a variety of substrates. It cleans a wide spectrum of materials and was comparatively cheap till a couple of years back. The offset printing industry adopted it in a variety of printing operations. This includes reviving and cleaning of blanket rollers, cleaning of scanner drums, exposure machines, binding machines and lamination machines. Its first and foremost use is for cleaning of film and astrolen sheet to remove dust, handling marks and ink marks. However, since a few years the price of CTC is steadily increasing and its price has more than doubled over the past two years. The reason for this is that India has reduced the supply considerably since 2005. The situation is sure to get worse as the supply will shrink until the complete stop in December 2009. But why is India doing this?

### CTC and the Ozone layer

Well, there are problems related to the use of CTC that are hard to ignore. After its use the solvent evaporates. Its vapours slowly rise up in the atmosphere, beyond an altitude of 15 kms. Up there it destroys the fragile layer of Ozone in the stratosphere, the very Ozone layer that protects our earth from harmful ultraviolet (UV-B) rays of the sun which can cause skin cancer, eye cataracts and which can also harm agricultural and marine produce. Over decades, this process of destruction through ozone depleting substances like CTC and CFC has thinned the Ozone layer so severely that it is now popularly referred to as "Ozone hole" is already eight times the size of India.

### What about workers' health?

There have always been concerns about CTC's impact on worker's health. Workers with occupational exposure have long complained of pungent smell, dizziness and nausea. CTC is very toxic and is proven to cause cancer in animals and is a suspected human carcinogen.

### Tackling the problem

To protect the Ozone layer India, along with 191 countries, has signed the Montreal Protocol on substances that deplete the Ozone Layer. The objective of this successful international environmental agreement, which celebrated its 20th anniversary in 2007, is to put an end to the depletion of the Ozone layer by systematically phasing-out all ozone depleting substances. The phase-out plan stipulates the total phase-out of CTC by 1st January 2010 and therefore the Government of India has instituted supply controls on CTC.

### Every drop counts

People often feel that using a few litres of CTC per year should not cause much harm. However, the truth is, a single chlorine atom from CTC in its life span of 25-30 years, can destroy up to one hundred thousand ozone molecules. Hence, every drop of CTC saved makes our earth a safer place.

### Advanced technologies

Advanced printing technologies, such as Computer to Plate (CtP) and Computer to Conventional Plate (CtCP), have made the use of film almost obsolete. However, in spite of these advanced

technologies the use of film in offset printing is prevalent mainly because medium and small enterprises cannot afford the adoption of this new technology. Besides, minor corrections are easier to carry out on the film and there are umpteenth customers who wish to have reprints of matter stored in film.

### Improved practices

Some offset units across the country adopt cleaner in-house practices and thus avoid a few of the contaminants such as dust and handling marks on films. The methods adopted are very simple. The films are paper wrapped and stored in drawers to avoid dust. The use of gloves while handling films also helps to a large degree in eliminating the handling marks. Such practises, needless to say, can surely reduce the need to clean film.

### Assistance by GTZ Proklima

Alternatives that satisfy industry requirements in all aspects are not easy to find or assess. Several critical aspects need to be considered, ranging from performance and possible damage to films to potential health and safety risks. German Technical Cooperation (GTZ) Proklima supports industries in the selection process, aiming to enable informed decision on transition to safe alternatives under an international mandate. GTZ Proklima disseminates technical information on viable substitutes through technical publications and industry seminars – free of charge for users of CTC. A publication dedicated to offset printing is currently under preparation.

### Alternatives for film cleaning

There is ample choice of suitable alternatives and some have already been adopted by the industry with satisfaction. To assess suitability more systematically GTZ Proklima has put a selection of about 10 substances through a specifically designed testing process. Attention was given to cleaning performance, drying speed and, among other things, the amount required. The table below shows substances which have passed the test and emerge as suitable for film cleaning.







Technical assessment	Amount required	Evaporation time at 32 °C	Limitations
Acetone	0.86 ml/cm <sup>2</sup>	2 sec	Strong odour
Film Kleen™	0.60 ml/cm <sup>2</sup>	17 sec	
n-Hexane	0.67 ml/cm <sup>2</sup>	1 sec	Pen marks not removed
Isopropyl Alcohol (IPA)	0.56 ml/cm <sup>2</sup>	26 sec	Strong odour
Methylene Chloride	0.75 ml/cm <sup>2</sup>	2 sec	Eye irritation
Toluene	0.49 ml/cm <sup>2</sup>	11 sec	Strong odour, eye irritation
White Petrol	0.67 ml/cm <sup>2</sup>	3 sec	Mild odour
Xylene	0.69 ml/cm <sup>2</sup>	65 sec	Strong odour, pen marks not removed

Risk assessment	Inhalation	Skin	Flammability
Acetone	Irritant	Irritant	Highly flammable
Isopropyl Alcohol (IPA)	Irritant	none	Highly flammable
Kerosene	Irritant	none	Flammable
Xylene, mixed isomers	Harmful	Harmful	Flammable
n-Hexane	Very toxic	Toxic	Highly flammable

Risk assessment	Inhalation	Skin	Flammability
Film Kleen [TechNova]™	Very toxic	Toxic	Highly flammable
Methylene Chloride	Very toxic	Toxic	Non-flammable
Toluene	Very toxic	Toxic	Highly flammable
White Petrol	Very toxic	Toxic	Highly flammable
Benzene	Irreversible	Irreversible	Highly flammable
Petrol, unleaded	Irreversible	Irreversible	Highly flammable







Alternatives should be selected from the safer band shown on top in light yellow (i.e. Acetone, IPA). Only if the technical requirement cannot be met with this choice a more harmful substance should be considered. Substances showing as 'irreversible' under inhalation as listed at the bottom of the table should be avoided completely. Should the final choice fall on a substance that is 'harmful', 'toxic' or 'very toxic', workers' exposure should be reduced to the minimum possible. This can be achieved through good housekeeping practices, good ventilation and, most crucial to all approaches, sensitizing of workers to the risks and possibilities (i.e. training) for their minimisation (i.e. good, safe work practice). GTZ Proklima will shortly publish more detailed information on health and safety aspects concerning personal protective equipment as interaction with and feedback from industries progresses further.

#### Invitation

GTZ Proklima invites all stakeholders - offset printing firms, industry associations and auxiliary suppliers – to contact us for any assistance that you may require. GTZ Proklima will continue to engage in active discussions with the industry to promote safe alternatives, free of cost.

Further information can be found at [www.ctc-phaseout.org](http://www.ctc-phaseout.org) or be requested by phone 9819475753 or email [dsilva.neelima@gmail.com](mailto:dsilva.neelima@gmail.com)

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Printvision India features the above article by way of support to Ozone Cell, an initiative by the Ministry of Environment and Forest, Government of India, which is the central agency coordinating the phase-out of CTC. The cell has established the regulatory framework and national phase-out plan. It ensures that domestic CTC production and import progressively decrease in compliance with national targets.

