

# Filter Bag Guarantees



Chris Polizzi, of W. L. Gore & Associates, writes about balancing your risk needs with your budgetary requirements.

## Introduction

Emissions limits continue to trend downward on a global as well as a regional basis, especially for particulate matter (PM) emissions. As a consequence more time, energy, and money is invested in decisions and air pollution control equipment and filter media. Within the cement industry, the number of baghouses being built every year as the primary air pollution control devices for kiln/mill emissions, alkali bypass emissions, and clinker cooler emissions increase. In some parts of the world, reverse air cleaning baghouses are becoming increasingly common, while in other regions jet pulse cleaning baghouses are becoming the standard air pollution control device of choice. In the majority of the kiln baghouses currently under construction around the world, higher performance expanded polytetrafluoroethylene (ePTFE) membrane filter bags are being selected as they may achieve the lowest possible emissions, low operating differential pressure, and long bag life. Expanded PTFE filters have consistently proven to

provide significant long term cost savings when compared to lower performing traditional media. But their higher initial cost, possibly ranging from hundreds of thousands to over a million US \$ for large kiln/mill systems, necessitates extensive performance assurances from suppliers.

There are varying levels of filter bag guarantees and warranties to ensure that an investment in high performance filter media balances the risk tolerance with budgetary requirements. These guarantees and warranties may cover items such as overall bag life, emissions, airflow and/or differential pressure. This article looks at these issues as they relate to offerings from W. L. Gore & Associates, Inc. (Gore).

## Filter bag life claims

A filter bag life guarantee should ensure that the operator will not experience any unexpected filter bag purchases or associated costs over the guarantee period, providing the baghouse is operated within "good, generally accepted industry standards."

One example of a Gore filter bag life guarantee for a

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pulse jet cement kiln baghouse equipped with a long life style bag like SUPERFLEX, filter bags, might state:

"Minimum bag life of 72 months. Bag failure in terms of life is defined as bags developing wear holes, rips or tears due to loss of strength, prior to reaching the minimum guaranteed bag life.

Remedy for bag failure in the event of wear holes, rips or tears due to loss of strength, prior to reaching the minimum guaranteed life is for Gore to supply replacement bags on a bag-by-bag basis."

Or it might read,

"Remedy for bag failure in the event of wear holes, rips or tears due to loss of strength, prior to reaching the minimum guaranteed life is for Gore to supply replacement bags in the compartment(s) where 10% or more of the bags have developed wear holes, rips or tears due to loss of strength."

### **Question: Does this 72 month bag life guarantee ensure my cement plant will not spend money on filter media for the next 6 yrs?**

The simple answer is, it depends. When looking for the right guarantee coverage for filter bag life, several issues need to be taken into consideration which include:

#### *Starting time*

Does the life of the bag begin at the time of shipment, or after a maximum number of months after shipment? Does the bag life begin at the time the filter bags are installed in the baghouse? Does the bag life begin when the baghouse is first operated? Understanding the level of guarantee required by a plant needs is essential.

#### *Protection in the event of unanticipated failure*

Is the bag life guarantee a 'Full' or a 'pro rata/prorated' guarantee, or is it a combination of both? Typically a 'Full' guarantee implies that in the event of a bag failure, filter bags will be replaced at no charge to the customer or a credit will be given in an amount equal to the original purchase price of the bags. In the event of a failure under a 'Prorated' guarantee, a credit toward replacement bags is typically offered and calculated according to a formula based on the percentage of life achieved versus the guaranteed life.

An example of how this formula might read in a guarantee is as follows:

"A credit will be given in an amount equal to a percentage determined by dividing the number of months remaining in the applicable warranty term by the number of months constituting the original warranty term, multiplied by the original purchase price of the filter bags." See the following Formula which is an example of credit under prorated portion of bag life guarantee.

# of months remaining

Credit = ----- x original filter bag price  
# of months in original warranty

As an example, if a filter bag having a 6 yr bag life on a prorated basis unexpectedly fails after 5 yrs of service and it was originally US \$100/filter bag, the credit would be US \$16.67/filter bag for use toward the future purchase of replacement bags.

Consider a second example where a filter bag

originally costs US\$ 100 and has a 6 yr bag life with the first 4 yrs being 'Full', and the last 2 yrs being 'Prorated.' Under this example, two different scenarios can be considered. In the first, the bags fail at 3 yrs and 11 months, and in the second scenario the bags fail at 4 yrs and 1 month. In the first case, replacement bags would be offered at no charge, and in the second, a credit would be offered totaling only US \$31.94/filter bag.

#### *Additional replacement cost*

With either a 'Full' guarantee or a 'Prorated' guarantee, there may be an additional cost associated with any failed filter bags. This is the actual cost of replacing the bags (removal of cage, bag, clean up of baghouse, re-installation of filter bag, re-installation of cage.) These costs can range from US \$5 to US \$12/bag for pulse jet style filter bags and can range from US \$15 to US \$25/bag for reverse air style filter bags.

Given these considerations, three possible levels of filter bag guarantees might be:

- Bag life guarantee (Example 1): This would cover the replacement of filter bags on a 'Prorated' basis over a period of 6 yrs.
- Bag life guarantee (Example 2): The replacement of filter bags on a 'Full' basis would be covered over the first half of a period of 6 yrs and would then cover the bags on a 'Prorated' basis over the second half of a period of 6 yrs.
- Bag life guarantee (Example 3): This would cover the replacement of filter bags on a 'Full' basis over the entire period of 6 yrs without a 'Prorated' period.

### **Claims of emissions**

The spirit of a filter bag emissions guarantee is for the supplier of the filter bags to ensure that the operator will not experience any unexpected downtime or fines from the local regulators stemming from bag emissions. This usually means emissions in excess of the guaranteed level over the guarantee period. Providing, of course, that the baghouse is operated within "good generally accepted industry standards."

One example of a Gore filter bag emissions guarantee for a pulse jet cement kiln baghouse equipped with SUPERFLEX filter bags might state the following:

"Maximum particulate emissions of 10 mg/m<sup>3</sup> through the filter media up to 650 000 actual m<sup>3</sup>/hr at 200 °C.

Remedy for bag failure in the event of emission in excess of guaranteed level is for Gore to supply replacement bags on a bag-by-bag basis until the emission level is met."

### **Question: Does this 10 mg/m<sup>3</sup> emissions guarantee ensure my cement plant will not have emissions in excess of 10 mg/m<sup>3</sup> over my guaranteed filter bag life?**

Again, it depends on the how the guarantee covers emissions. Several issues need to be considered.

#### *Cover period*

Does the emissions guarantee cover only the first 90 days of operation, or only the 'Full' portion of my

guarantee? Does the emissions guarantee cover my entire guaranteed bag life?

### *Protection in the event of emissions in excess of the guaranteed level*

Does the guarantee cover only the first 90 days of operation, or only my first stack test? Is the guarantee on a 'Full' basis or a 'Prorated' basis? Does it cover the responsibility to determine the cause of the emissions? Does it cover any additional stack testing which must be performed as a result of a test which shows a plant may be out of compliance? Does the guarantee cover payment of fines and associated cost for any compliance claims made against the plant?

Given the above considerations, three possible levels of filter bag emissions guarantees might be:

- Filter bag emissions guarantee (Example 1): The filter bag emissions guarantee would cover the emissions of the baghouse for the first 90 days of operation.
- Filter bag emissions guarantee (Example 2): It would cover the emissions of the baghouse for the entire guaranteed bag life on a 'Prorated' basis. In the event of emissions in excess of the guaranteed level, Gore would help identify the cause and replace any necessary filter bags.
- Filter bag emissions guarantee (Example 3): The guarantee would cover the emissions of the baghouse for the entire guaranteed bag life on a 'Full' basis. In the event of emissions in excess of the guaranteed level, Gore would help identify the cause and replace any filter bags necessary.

## **Differential pressure**

A filter bag differential pressure ensures that the operator will not experience an operating differential pressure in excess of the guaranteed level over the guarantee period, providing the baghouse is operated within "good generally accepted industry standards."

One example of a Gore filter bag differential pressure guarantee for a pulse jet cement kiln baghouse, equipped with SUPERFLEX, filter bags might state the following:

"Maximum  $\Delta P$  of 150 mm H<sub>2</sub>O when the system is operated within the specified performance conditions and with an optimised cleaning cycle as determined by Gore.

Remedy for bag failure in the event of differential pressure in excess of the guaranteed level is for Gore to supply replacement bags on a bag-by-bag basis until the pressure drop guarantee is met."

**Question: Does my 150 mm w.g. differential pressure guarantee ensure my baghouse will never operate above 150 mm w.g. over my guaranteed filter bag life?**

When looking at a guarantee covering the differential pressure of the baghouse, again the balance of risk requirements needs to be weighed against budgetary constraints.

### *Extent of coverage and measurement*

Does the differential pressure guarantee cover the entire baghouse (flange to flange) or individual

compartments? Does it cover the average differential pressure or the continuous differential pressure at any time? Does the differential pressure guarantee include only the full coverage portion of the guarantee or the entire guaranteed bag life? Are all the bags replaced, or just specific bags, or specific compartments of bags but not other compartments?

Again, given these considerations, three possible levels of filter bag guarantees might be the following:

- Filter bag pressure drop guarantee (Example 1): The guarantee would cover the average differential pressure (across each compartment) of the baghouse rising above the maximum specified. The coverage would be on a 'Prorated' basis.
- Filter bag pressure drop guarantee (Example 2): This would cover the average differential pressure (across each compartment) of the baghouse rising above the maximum specified. The coverage would be on a 'Full' basis.
- Filter bag pressure drop guarantee (Example 3): The differential pressure guarantee would cover the average differential pressure (across each compartment) of the baghouse rising above the maximum specified. This would be on a 'Full' basis. In the event of differential pressure in excess of the guaranteed level, Gore would: (1) Help identify the cause, (2) Replace any filter bags free of charge, and (3) Cover the cost of the replacement filter bag change out.

## **Other factors and conditions**

Once filter bag life, emissions rates, and differential pressure guarantees have been negotiated, it is important to investigate any and all factors which a filter bag supplier might use to his advantage to escape fulfilling a guarantee obligation.

Examples such as not having actual documented operating data, not being able to prove operation of baghouses within acceptable design limits, or showing preventive maintenance records, may be the technicalities which could be the difference between an acceptable guarantee settlement, or unwanted legal battles.

In most instances, even when a filter bag supplier stands completely behind its guarantee, it could still cost a plant operator unexpected expenses such as a 'Prorated' filter bag purchase, the cost of new cages, the cost of an installation, fines from regulators and most importantly the cost of lost production due to unanticipated downtime.

## **Conclusion**

Ultimately, it is in the best interest of the plant operator to use proven suppliers so that the guarantee will not be as necessary. But, when engaging in such large investments it is crucial to spend time to thoroughly understand the actual performance promises contained in product guarantees. If this is carried out one will be assured of getting the optimum performance from both the system and the system's suppliers.