



## BEAT THE HEAT

# Avoid costly plant shutdowns with high temperature application glovebags

Dealing with asbestos abatement at industrial sites like power plants, paper mills, oil refineries, manufacturing and processing plants, and similar facilities is no small matter. Handled improperly, these projects can be a life-or-death issue due to the life-threatening health risks posed by asbestos-containing materials (ACM). Consequently, government authorities like the Environmental Protection Agency (EPA) and the Occupational Health and Safety Administration (OSHA) heavily regulate – and thus can complicate – these projects. Further, handled inefficiently, asbestos removal efforts can cost facilities millions of dollars or more in lost revenue – particularly if the project requires high-temperatures pipes to be cooled first or causes other disruption.

Solutions like full containment just add cost and labor while requiring shutdowns. So, what can facilities do when they need to remove asbestos quickly, safely, and without disrupting operations? High temperature glovebags rated for temperatures above 150°F have been approved by OSHA for use in asbestos removal projects, and they bring all the same benefits and advantages of standard glovebags into a wider range of applications.

How does this specialized type of glovebag enable organizations to undertake major asbestos abatement projects with little to no disruption while yielding safety benefits and excellent ROI?

That's what this paper will detail.

# HIGH TEMPERATURE ASBESTOS ABATEMENT POSES DISTINCT RISKS

***FRIABLE ASBESTOS – ASBESTOS THAT’S EASILY CRUMBLED WHEN DISTURBED – CAN POSE SERIOUS HEALTH RISKS.***

Exposed workers can develop a variety of ailments, including asbestosis, mesothelioma, and other conditions, even years after the fact.<sup>i</sup> As a result, when industrial facilities find themselves undertaking renovation or maintenance projects in which workers might be exposed to asbestos used as insulation, both the Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) mandate extensive precautions.

Organizations have many options for dealing with asbestos, including managing in place, encapsulation, enclosure, and removal. For the purposes of this paper, we will be focusing on the removal option and assuming that readers are seriously considering or have already determined that they wish to remove ACM from existing plant pipes.

So, what is the least-cost, most efficient manner to remove existing ACM?

Glovebags are already the go-to option in many situations, especially when temperature is not an issue. Glovebags have long been a staple of the asbestos abatement toolkit because they simplify the removal process, cost less, and promote greater safety. The benefits of glovebags are well documented:

“Using glove bags, we can perform many jobs at about one fourth the cost and with half the manpower that would be required to construct negative pressure enclosures,” Ronald H. Robishaw, then mechanical maintenance supervisor for Michigan-based Consumers Power (now Consumers Energy), told Power Engineering Magazine when OSHA first approved glovebags for use on asbestos abatement projects.<sup>ii</sup> “Monitoring of work done with glovebags has shown consistently low levels of asbestos, well within permissible limits.”

***THOSE BENEFIT CLAIMS ARE BACKED UP BY ACADEMIC ASSESSMENTS.***

According to a report from the University of Oregon analyzing the comparative costs of asbestos abatement methodologies, “when glovebags were used, there was the potential to save building owners money. This was due to the fact that abatement workers could safely remove ACM quicker and without the need for costly, large, negative pressure enclosures.”<sup>iii</sup>

However, OSHA has historically limited the use of glovebags to pipes at temperatures less than 150°F. For many facilities, that would automatically rule out standard glovebags, leaving no choice but to pursue other options like full containment, no matter how costly, laborious, or disruptive they might be. Indeed, particularly in applications involving pipes that run hot (like hot water heating systems), most facilities assume they must choose between extremely difficult and expensive containment options and shutting down the hot pipes to allow them to cool, thus losing productivity and revenue.

Indeed, even partial shutdowns can mean losing a lot of revenue. Finding the right method of asbestos abatement for industrial facilities can be a matter of millions of dollars. Given that downtime averages \$500 per minute at manufacturing plants, that means full containment options that require partial or full shutdown can cost hundreds of thousands of dollars per day and millions of dollars over the course of an abatement project.<sup>iv</sup>

There’s another way. High temperature glovebags are rated to work with pipes as hot as 700°F, enabling facilities to remove asbestos more safely and economically – minimizing disruptions to operations and without shutting down. But what are high temperature glove bags, and how do they yield safety, labor, and cost benefits during asbestos abatement projects?

## WHAT ARE HIGH TEMPERATURE GLOVEBAGS?



OSHA defines glovebags as an “impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled. The glovebags attach to the portion of pipe being worked on.”<sup>v</sup>

Glovebags – both standard and high temperature models – are appropriate for removing ACM from pipes (including valves, joints, and elbows, subject to the dimensions and configuration of the specific glovebag used). The glovebags, typically made out of 6 mil polyethylene or similar material, come in different sizes to accommodate varying diameters for both horizontal and vertically situated pipes.

In effect, glovebags are miniature containment systems, equivalent to full containment in all but size. They allow safe and efficient removal of ACM, protecting workers from exposure to asbestos fibers while allowing them to work quickly, with far less setup and cleanup.

High temperature glovebags are constructed out of a heavy-gauge woven fabric that can withstand temperatures as high as 700°F. They are designed for high temperature pipes like low pressure steam lines and hot water heating systems. A refinery or an industrial plant could use these high temperature glovebags if they don’t have the time or the desire to turn off the steam, hot water, or anything else that is elevating the temperature of the pipe. Thus, they allow for emergency repair and maintenance on active pipes and eliminate the need for costly shutdowns.

Most importantly, high temperature glovebags satisfy all OSHA requirements.

For example, OSHA requires that glovebags be formed without a bottom seam or weld.<sup>vi</sup> This requirement reduces the risk that the weight of the asbestos-containing waste sitting on the bottom of the bag would tear through the bag. OSHA also requires that these bags be used as intended without modification in single-use applications.

In 1995, OSHA issued a letter allowing the use of an “innovation in glovebag technology”<sup>1</sup> on pipes over the 150 °F limitation that is imposed on standard 6 mil polyethylene glovebags.<sup>vii</sup>

<sup>1</sup> Specifically, this innovation in technology is the Therm-Equip High Temperature Application Glovebag.



## HOW DO THEY WORK?

Functional operation of high temperature glovebags is identical to the use of standard glovebags. In general, the work area – approximately 3' of piping per glovebag – will be prepared if necessary, and then glovebags will be affixed to the pipe. Depending on the model selected, they can be affixed for an air-tight attachment with heavy-duty duct tape; belt-type harnesses; or staples and vulcanizing silicone. Though protected from exposure to ACM, workers still need to wear Personal Protection Equipment, if only to insulate them from the heat being generated by the pipes.

The user can then strip and clean the pipe with tools inside the bag. The asbestos-containing waste falls into the bottom of the glovebag, which is designed to be separated and sealed off. With all the ACM in the bottom of the glovebag, the user collapses the bag, with a HEPA-filtered vacuum, and twists the bag off so that the debris area is separated from the work area. The user then tapes up that section between the debris area and the work area and cuts the bag to separate the work area from the debris area. If appropriate, any remaining material in the pipes can be encapsulated with a suitable sealant. After removal of the ACM, the work area will be cleaned and decontaminated.

Once the process is completed, users dispose of the asbestos-containing bag in compliance with local laws concerning proper methods for removing, handling, and disposing of ACM.

# UNDERSTANDING THE VALUE OF HIGH TEMPERATURE GLOVEBAGS.

## FULL CONTAINMENT

The most common alternative to high temperature glovebags is full containment of the entire work area. To understand how high temperature glovebags compare, it's worth taking a moment to review the full containment approach.

Typically, full containment means completely isolating the area where the asbestos abatement will be undertaken with two layers of 6 mil polyethylene sheeting covering walls, floors, and entries/exits. Then, negative pressure must be created within the contained area to prevent the escape of any stray asbestos fibers, and the air needs to be filtered as well. After the asbestos abatement work is completed, the entire area must be fine-cleaned, including HEPA-rated vacuuming and wet-wiping surfaces. All of this requires a significant investment of man-hours, materials, tools, equipment, and machinery.

As a result, though the process of establishing full containment is not particularly complex, it can be difficult, time-consuming, and generate a number of disadvantages.

- It takes an enormous amount of space.
- It requires a lot of raw material, including machinery to generate negative pressure.
- It takes a significant amount of labor to set up, clean, and take down.
- It may necessitate a partial or full shutdown of operations.

That last point is particularly salient. Pipes must be cooled down, which can mean shutting down the facility, in full or in part, resulting in loss of productivity. Full containment demands a lot of space, resources, and labor; which in turn means there's just more surface area for potential problems or errors to arise.

## HIGH TEMPERATURE GLOVE BAGS

Like regular glovebags, high temperature glovebags are simply far more economical in almost every respect when compared to full containment: less material, less labor (perhaps half as many man-hours required for setup and takedown), less cleaning, and less equipment required. They are faster to set up and to take down; and mandatory cleaning is limited to the area of asbestos exposure within the glovebag.

In short, high temperature glovebags free facilities from all the extensive requirements imposed by full containment systems, as "on-site construction of negative pressure enclosures is no longer required for these situations," as Power Engineering writes.<sup>viii</sup> "In many instances, glove bags allow a safer and cleaner operation."

It does bear noting that glovebags are not necessarily always the better option; facilities still need to evaluate their unique circumstances to identify the optimal, least-cost option for asbestos abatement.

Also, both glovebags and full containment do overlap in some areas. All the same safety regulations apply, workers must still use Personal Protective Equipment (PPE), waste disposal must still be handled according to the same guidelines, and decontamination facilities still need to be provided. That said, since workers using glovebags are outside the contaminated area, decontamination procedures are much simpler.

Comparison Summary	
Full Containment	High Temperature Glovebags
Workers are inside the area with airborne asbestos	The worker is not inside the contaminated area
More opportunities for exposure and other risks	Easier to ensure safety
Many man-hours required to construct; much more involved.	Fewer man-hours and materials
A decontamination facility must be available and used	Decontamination showers only need to be available
Containment may disrupt facility operation	Shutdowns can be avoided, even while high temperature pipes continue running

## PRODUCTIVITY AND COST CONSIDERATIONS

In industrial facilities like oil refineries or manufacturing plants, the primary cost advantage is the ability to avoid or minimize either partial or complete shutdowns while the asbestos abatement work is completed.

This is no small consideration; in fact, it's commonly a matter of millions of dollars. As Business and Industry Connection Magazine writes, "With downtime in manufacturing plants averaging \$500 per minute, increasing uptime, even incrementally, makes a major contribution to the bottom line." ix

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*Business and Industry Connection Magazine*

## SAFETY CONSIDERATIONS

All of OSHA's and the EPA's safety guidelines are geared toward one goal: ensuring that human workers avoid exposure to ACM.

The whole point of any form of containment is to keep all the ACM in a single, controlled area where it can be completely isolated and disposed of.

Full containment means that workers are inside the containment area with asbestos fibers. Thus, they'll wear full PPE, including respirators, and go through full decontamination procedures.

A glovebag, by contrast, is a small, totally enclosed containment area that enables workers to remove ACM without ever being exposed to it. All asbestos fibers are limited to a single, small, manageable area. Though workers still wear PPE, it's no longer the first layer of protection against asbestos, but the second. That adds another dimension of protection and risk mitigation that full containment cannot.

Further, there's less surface area for risk. With less equipment, fewer materials, and less time involved, the opportunity for exposure to hazards is minimized.

## Cost Savings from Using High Temperature Glovebags in a Typical Facility

	Lost Revenue			Cost of Removal			Grand Total
	Project Duration	Est. Cost Per Day	Subtotal	Footage	Est. Cost Per Foot	Subtotal	
Without HT Glovebags	120 days	\$360k <sup>(1)</sup>	\$43.2M	1200 feet	\$15.96 <sup>(2)</sup>	\$19k	\$43.2M
With HT Glovebags	60 days		\$21.6M		\$667	\$800k	\$22.4M

**Est. cost savings from using HTGBs: \$20.8M**

### Notes

Though the cost of using HTGBs over other methods can be significant, economizing the project schedule has an outsized impact to total project costs. By completing the project faster - in two months rather than four - facilities can significantly shorten shutdowns and save tens of millions of dollars on lost productivity and revenue.

(1) Based on estimated revenue loss of \$500 per minute in typical manufacturing facility

(2) Based on figures from Oregon State University, adjusted for inflation, for standard asbestos removal and disposal

### CASE IN POINT: THE BP-HUSKY TOLEDO REFINERY

Consider the experience of one refinery, a joint venture between BP and Husky that produces jet fuel. Needing to replace several thousand feet of piping, they realized (1) that full containment would need to encompass an absolutely enormous area and (2) would require shutting the facility down for longer than necessary, meaning losses of six figures per day in revenue. They decided to remove asbestos before shutdown so pipefitters could get right to work. Fifteen people spent two months on the asbestos abatement portion of the project. Granted, the high temperature glovebags were more expensive than standard glovebags; the project was so large, they spent around \$700,000 to \$800,000 on high temperature glovebags. However, use of high temperature glovebags spared the facility two (or more) extra months of shutdown, plus the costs of pipefitters waiting around while asbestos was removed. That means the glovebags effectively paid for themselves in just days by enabling the plant to continue generating revenue during the asbestos removal. In short, the expense was negligible and preserved millions of dollars in revenue. "The cost of the asbestos removal was insignificant relative to lost revenue," says Andy Shammo, the superintendent who oversaw the project.

*"The cost of the asbestos removal was insignificant relative to lost revenue."*

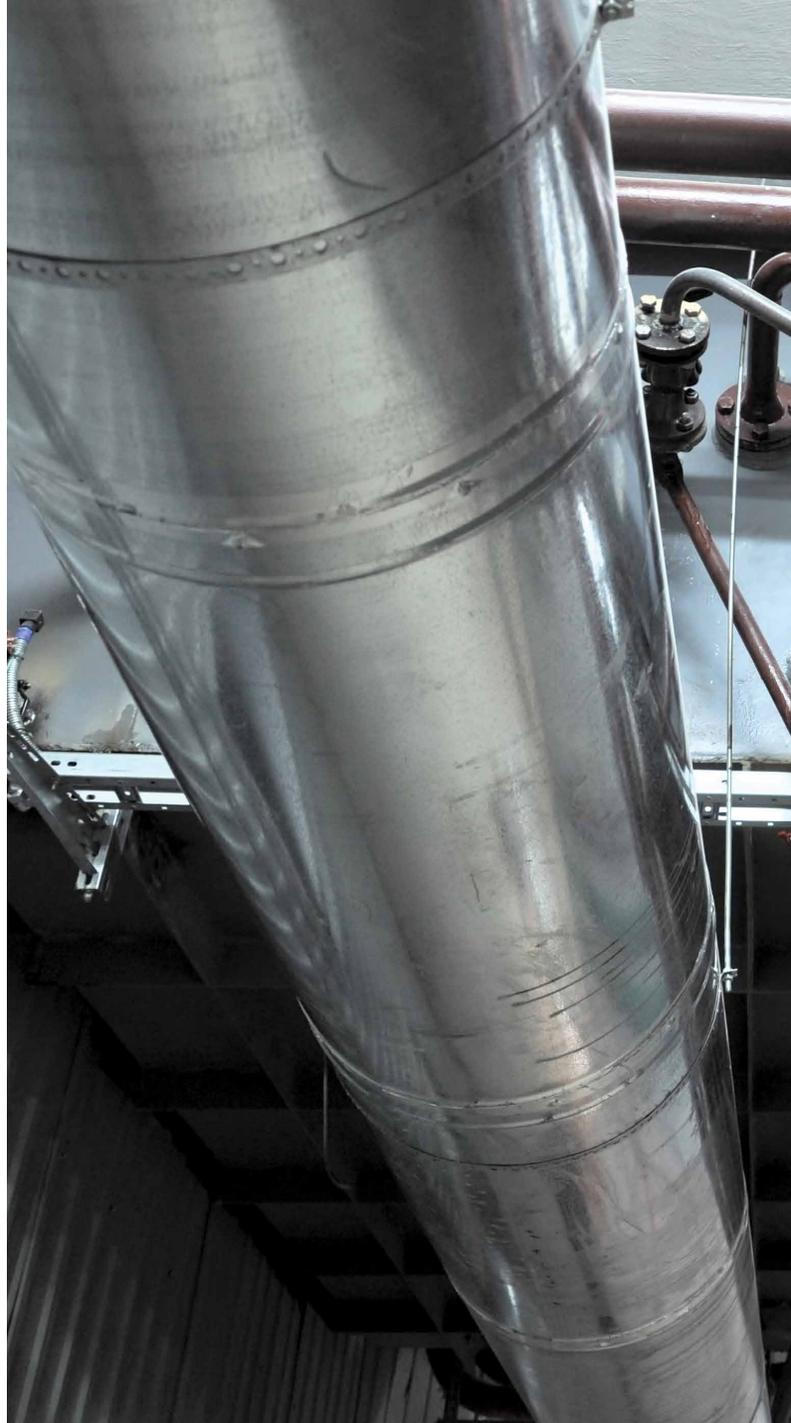
## CONCLUSION

Major industrial facilities, from manufacturing plants through oil refineries, don't want to take themselves offline to do renovations or maintenance. Yet, to remove asbestos from their facilities, particularly in situations where pipes run hot, they may think they have no choice but to shut down production and let pipes cool to 150°F. That could take anywhere from hours to days; then they would have to do an elaborate full containment process that involved negative air pressure, filtration, and more; and only then could they complete the work – all while accruing costs and losing money.

There's another option – a product that could save time by not having to shut down production – that delivers high return on value and safety. OSHA-approved high temperature glovebags enable facilities to remove asbestos even when pipes are still hot and the plant is still in production. Further, these glovebags contain the ACM rather than forcing the worker to labor in a contaminated area, making it both safer and more efficient to use this product.

For more information about high temperature glovebags, including technical specifications and usage directions, visit us online for additional downloadable content at:

<https://www.ilcdover.com/catalog/high-temp-glove-bag>.



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