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How to Estimate the Cost of Exterior Wall Blown In Blanket System (BIBS)

TABLE OF CONTENTS

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SECTION 1: INTRODUCTION

This technical paper will provide the reader with a general understanding of a Blown In Blanket System (BIBS) and provide an overview of the basic cost factors a professional estimator should consider when estimating this type of system.

CONSTRUCTION SPECIFICATIONS INSTITUTE

MAIN CSI:	**Division 07**	
	Thermal and Moisture Protection	
	07 21 00	Thermal Insulation
	07 21 26	Blown Insulation
RELATED CSI:	**Divisions 06 and 07**	
	06 11 00	Wood Framing
	06 16 00	Sheathing
	07 25 00	Weather Barriers
	07 84 00	Firestopping

BRIEF DESCRIPTION OF SUBJECT MATTER

The Blown In Blanket System (BIBS) is a tested, proven insulating system using fiberglass blowing wool, similar to the fiberglass used in batt and blanket insulation, but not bound together with glues or binders. This blowing wool is installed in the cavity spaces of walls, floors, attics, and cathedral ceilings, after a special mesh fabric (netting) is installed against the framing members. Like a perfectly fitting blanket, the blown in insulation completely fills in around any plumbing, electrical wiring, and other objects within the cavity, eliminating all gaps and voids, increasing thermal efficiency and producing higher R-values than could be obtained with regular batt or blanket insulation.

Section 2: Types and Methods of Measurements

While most insulation is estimated in square feet (SF), quantity take-off can be completed by measuring areas in square feet or by measuring linear feet (LF) of a wall with a known height. Exterior walls can be measured by both area square feet using the elevations and/or linear feet using the floor plans, depending on the project. Areas in the wall that are not going to receive insulation, like windows and doors, will need to be deducted or backed out from the insulation square foot totals, including any space taken up by headers above the windows and doors.

The mesh fabric netting that retains the blown in insulation within the cavity is estimated by square feet. The same square foot quantity that was determined for the insulation can be used for the netting, however the backed out areas will not be deducted from the total because the netting will be stretched over the entire area, including opening such as windows and doors.

Depending on where the project is located, an air barrier and/or vapor retarder may be required, either to the warm side or cold side of the wall assembly. For example, a 4mil visqueen on the inside of the wall, over the top of the netting, might be required. This visqueen is also estimated by square feet using the same total used for the netting, as it will also be stretched over any openings in the wall.

Both the netting and the visqueen will be stapled to the faming members. The netting will be stapled using an auto-fire air staple gun specifically made to staple in a rapid manner as the stapler is dragged down the framing member. The visqueen will be stapled much more sparingly using a hammer-stapler. Both methods of stapling are very fast and require only a small amount of labor. For some contractors, staples might be considered part of the cost of doing business and install trucks would just always be stocked with a good supply. If the staples are going to be included as a cost item, they should be estimated per each (EA) box. The quantity of boxes needed can be easily determined by using a ratio of staples per square foot multiplied by the SF area to be cover by the netting or visqueen.

Labor is calculated per man hour. The estimate should include man hours for::

- Loading or stocking the truck
- Travel to and from the jobsite
- Jobsite set up or shakeout
- Mesh Fabric installation
- Blowing Wool installation
- Vapor Retarder / Air Barrier installation (if required)
- Jobsite Cleanup

Overhead, markup, and tax can generally be calculated as a percentage of the total construction cost.

Section 3: Specific Factors to Consider in Takeoff and Pricing

Specifications and Construction Documents

Special attention should always be given to the specifications and construction documents. Required R-values, necessary air barriers or vapor retarders, and additional code requirements all need to be considered when estimating the project. However, while the plans and specifications may be clear as to what is to be installed, some factors of the BIBS system cannot be changed. The depth of framing members will dictate the maximum R-values that can be obtained. Also, the cavity must be filled completely regardless if this will use extra material or provide a higher R-value than what was specified. A 2x4 wall cavity will never be able to reach the same R-value of a 2x6 wall cavity, even if the specification requires the higher rating. Any deviation from the plans and specs should be noted and addressed in the proposal. This will be useful when comparing the proposal with other bidders, as these difference can help explain large pricing discrepancies between competitors, as well as make it easier to determine the lowest responsible bidder.

Wage Rate Requirements

Some projects will have prevailing wage requirements. These wage rates will vary by location and should always be investigated and considered when estimating labor costs. Failing to do so can lead to overages in labor costs, as well as fines or penalties.

Small Projects vs. Large Projects

Every job is different. Some costs will have more effect on smaller jobs, while other cost will more significantly affect larger projects. However, some costs need to be accounted for regardless of size.

Loading Delivery Truck – smaller projects will require less material and thus less time to stock the truck compared to larger projects.

Jobsite Location and Subsistence – depending on the distance from the warehouse to the jobsite, travel time will vary from project to project and subsistence may be required for projects that are longer distances away. While this can increase the cost of smaller projects, with larger projects that are longer distances away, subsistence can help reduce the costs of multiple trips and allow more daily man hours to be allocated to installation.

Jobsite Setup and Shakeout – every project will require time to set up ladders or scaffolding, roll out blowing hoses and compressors, and carry in the mesh fabric and other equipment as needed. Larger projects may require more time to do so.

Installation Time – installation time will vary according to how large the project is (or how many bags of blowing wool will be installed,) however, productivity will also be affected by the ease or difficulty to reach the areas to be insulated. Productivity on multi-story projects will go down as the work progresses higher up the building.

Cleanup – every project will need cleanup after installation. Installing BIBS can be a little messy. With an insulation vacuum, most of the fallout insulation will be recycled back into the blower machine, but a light sweeping of the jobsite will still be required, along with rolling up the hoses and returning all equipment back to the truck at the end of each day.

Doubling the labor should effectively cut the installation in half, while keeping the same cost per square foot.

Section 4: Overview of Labor, Material, Equipment, Indirect Costs and Markups

LABOR

Labor costs are calculated per man hour. An installation crew will generally consist of one foreman and two installers. Larger projects could require additional installers, but that would necessitate an additional blowing machine as well. Doubling the labor should effectively cut the installation time in half, while keeping the same cost per square foot. For the purposes of this paper, an approximate hourly rate, including labor burden, of $16.00 per foreman and $12.00 per installer or $40.00 per crew will be used.

Examples of productivity rates are as follows:

- Loading Trucks – 10 to 20 minutes per man per day
- Jobsite set up and shakeout – 10 to 20 minutes per man per day
- Install netting – 1,600 SF per man day
- Install blowing wool insulation – calculated by the number of bags of blowing wool per hour or per man day (this rate will vary depending on the type blowing machine and how it is set up)
- Install visqueen (if required) – 1,600 SF per man day
- Cleanup – 10 to 20 minutes per man per day

MATERIAL

- Netting – per SF (available in 8, 9 and 10 foot by 350 foot rolls)
- Fiberglass blowing wool – per bag (consult manufacturers product data sheet[1])
- 4mil visqueen – per 10' x 100' or 1,000 SF roll (also available in 8 foot rolls)
- Standard staples – per box of 5,000 (example: one box per 2,500 square feet of visqueen)
- Auto-fire staples – per box of 5,000 (example: one box per 100 square feet of netting)

EQUIPMENT

While equipment is typically owned, if rented, appropriate costs should be included. Examples of equipment are:

- Truck mounted blowing machine and blow hoses
- Ladders and scaffolding, Extra scaffolding or man lifts rented as needed
- Air compressor, air staple guns, hoses
- Brooms and Shovels

INDIRECT COSTS

Indirect costs are additional expenses required for the operation of the contracting business but not part of the materials, labor and equipment used to complete the project. Often, these cost are included as a percentage of the project cost, based on historical averages, when it is difficult or not possible to apply these costs directly to the project. Examples of indirect costs related to insulation contracting include office / warehouse overhead, project management, administrative staff, payroll burden, tools and safety equipment, vehicles, insurance, taxes and bonding.

APPROACH TO MARKUPS

There is no set rule or exact science for setting a Markup. Markup is generally determined by several factors. While there is always a bare minimum percentage for which the company is willing to do the work, nobody likes to leave money on the table. Everybody would like to make as much profit as possible, and at the same time, not price themselves out of the market or project. Some things to consider when determining an appropriate markup are:

- **Project Risk** – Every project has some risk involved, some more than others. It is generally accepted that the higher the risk, the higher the markup.
- **The size of the project** – Smaller projects may require higher markups in order to cover indirect costs or to make the job profitable enough to pursue. Larger projects may allow for lower markups as indirect cost impacts can be lessened when spread out over the entire project. Also, larger projects with larger contract values can produce higher profit totals, even when using a lower markup percentage. For that reason, using a lower markup on a larger project is a tactic regularly used to win the project while still being able to make larger profits compared to smaller projects. On the other hand, some larger projects may be too big for the competition. Considering the number of competitors and their ability to do the work is just as important. If the likelihood of competition on a particular project is lower, this may be an opportunity to keep markups higher than what might be used on other large projects.
- **Market Conditions** – The current construction market climate should always be considered. The amount of work available to bid in the market can drive markups up or down. If there is little work available, markups tend to be lower as the competition gets more aggressive. When there is an abundant amount of work available, markups will generally go up, especially as current backlogs increase and contractors become more selective about the projects they will pursue. Recent success rates in bidding and procuring other projects can be a great indicator of market conditions. If recent success rates are higher or lower than what would be considered normal, pricing and markup should be reconsidered.

Section 5: Special Risk Considerations

Job readiness / Job Schedule – Every project has a schedule and deadline to be finished. Many times there will be portions of a project that will be ready before other areas. Other times, preceding contractors fail to complete their work on time or may have missed some work, which can cause unexpected delays for the crew installing the blowing wool. Either of these situations can force additional trips to the jobsite, additional setups or shakeouts, and additional cleanups. While every effort is made to identify areas that may need additional trips, not everything will go as planned. For instance, if the exterior sheathing was not installed on an exterior gable wall before the crew arrives to install the blowing wool, the crew might have to return another day to finish. One option might be to install the netting on both sides of the framing member, allowing the crew to finish the installation and not require an additional trip to the jobsite. The cost of extra labor and netting may be very small compared to returning to the jobsite after the problem is corrected. Additionally, having to return unexpectedly to a jobsite can cause scheduling conflicts with on other projects.

Insulation Density – On any project, the blowing wool needs to be installed to the proper density. The Blown In Blankets System is engineered to be installed to a density of either 1.5 or 2 pounds per square foot (lbs./SF.) The 2 different densities will produce different R-values within the same cavity space, and will require different amounts of blowing wool to be installed. Depending on the R-value required and the cavity depth, the required density can be determined as well as the proper amount (number of bags) of blowing wool to include in the estimate. Failure to install the proper density can lead to several problems. If a 1.5 lb. density is required, installing a higher density will use more blowing wool than was estimated, resulting in extra costs. If a 2 lb. density is required, installing a lower density will result in a lower R-value than what was required, which could result in returning to the project for additional work to bring the blowing wool up to the proper density. Installing higher than a 2 lb. density can cause the netting and insulation to balloon out past the framing members. Any ballooning can cause drywall screws to pop and will not let the drywall lay flat, giving the wall a wavy look. This could result in removing everything back to the empty cavityand starting over, as well as back charges and loss of future work. Even with a good estimate, without the proper training of employees, any job can go badly.

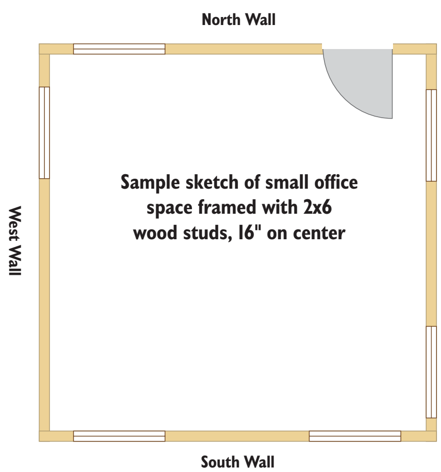
Section 6: Ratios and Analysis

Every company (and estimator) should maintain a database of unit cost, assembly costs, labor rates, production rates and costing for unique project aspects that have been estimated and/or installed on past projects. Using this historical data while preparing the estimate can increase its accuracy, as well as save time putting the estimate together. After the estimate has been prepared, it can be analyzed using this same historical data to make sure that the estimate is following the same square foot cost ratios of similar projects. The comparison should include projects that used the same R-value and assembly as the estimate. The labor costs per square foot can also be compared to labor costs of similar projects. Making sure all aspects of the estimate fall within known parameters of completed projects will help to detect and prevent errors and omissions.

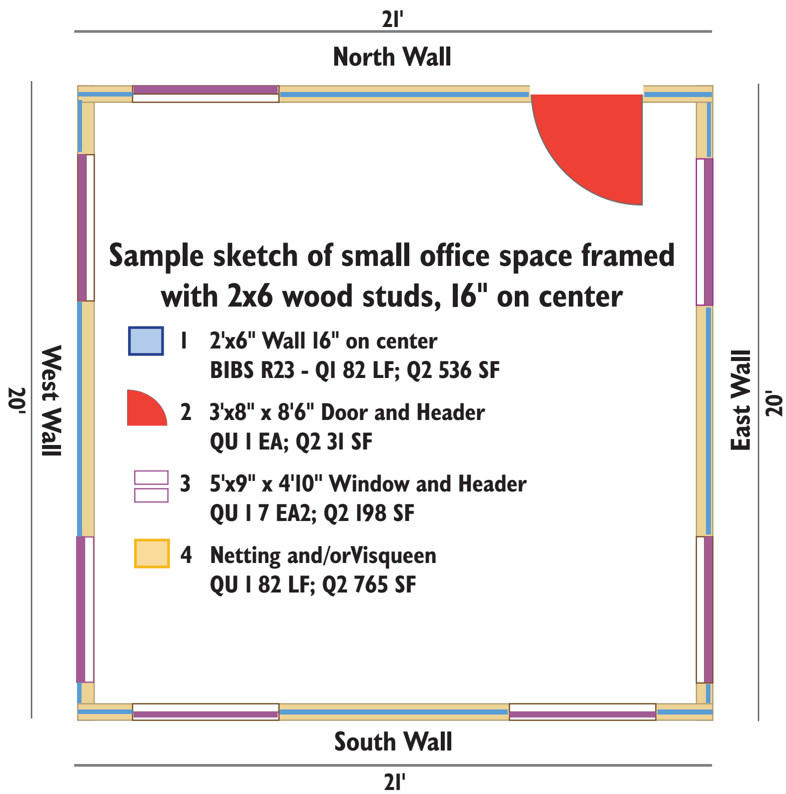
Section 7: Other Pertinent Information

Green Building has become an integral part of the construction industry. Properly installed insulation plays a big part in building Green. Any LEED or sustainability requirements for a project should be projects noted and followed. These requirements can create the need for additional record keeping and reporting. The costs for this additional work will usually fall into the indirect cost, but should be accounted for.

Section 8: Sample Sketch



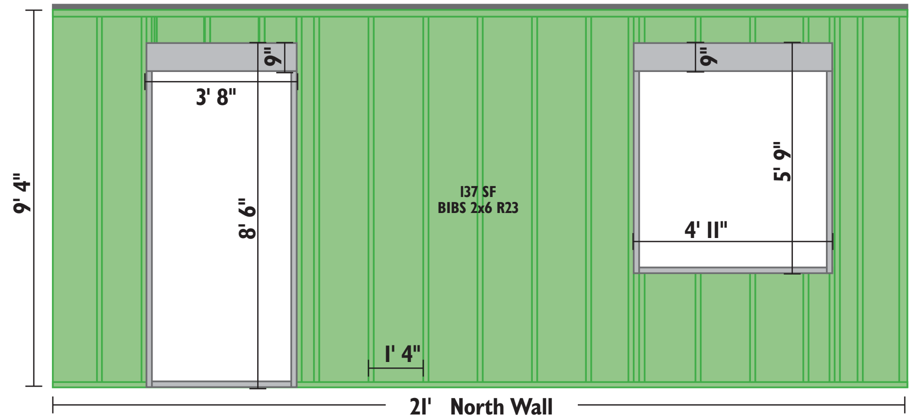
Section 9: Sample Takeoff and Pricing Sheet



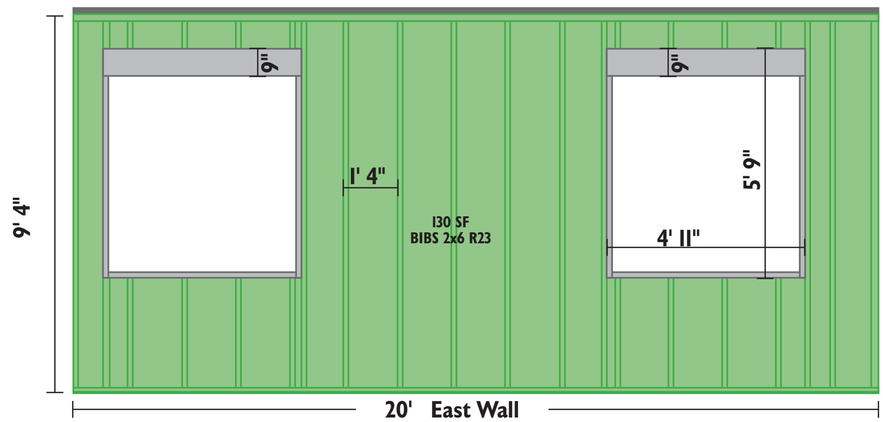
No.	Name	Qty1	UOM1	Qty2	UOM2
Insulation Takeoff					
1	2x6 Wall 16" on center - BIBS R23	82.00	LF	536.3	SF
2	3'8" x 8'6" Door and Header	1.00	EA	31.2	SF
3	5'9" x 4'10" Window and Header	7.00	EA	197.9	SF
4	BIBS 2x6 R23	536.11	SF	765.3	SF
5	Netting and/or Visqueen	82.00	LF	765.3	SF

Example of Area Square Feet Takeoff

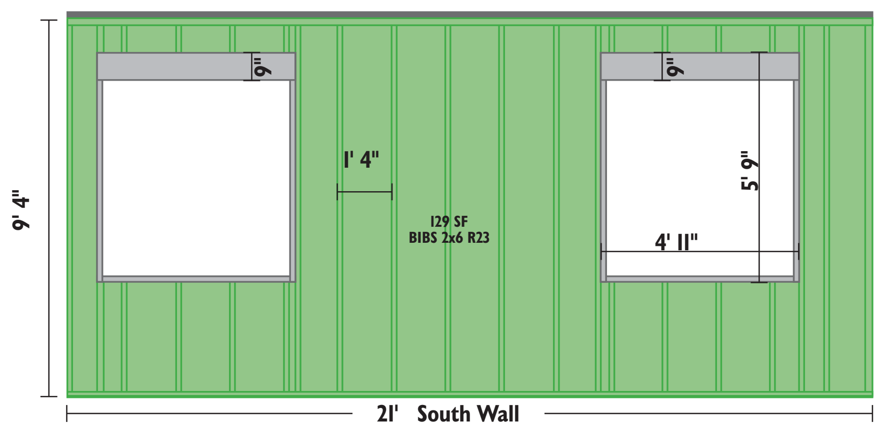
■ BIBS 2x6 R23 - Q1 137 SR; Q2 197 SF



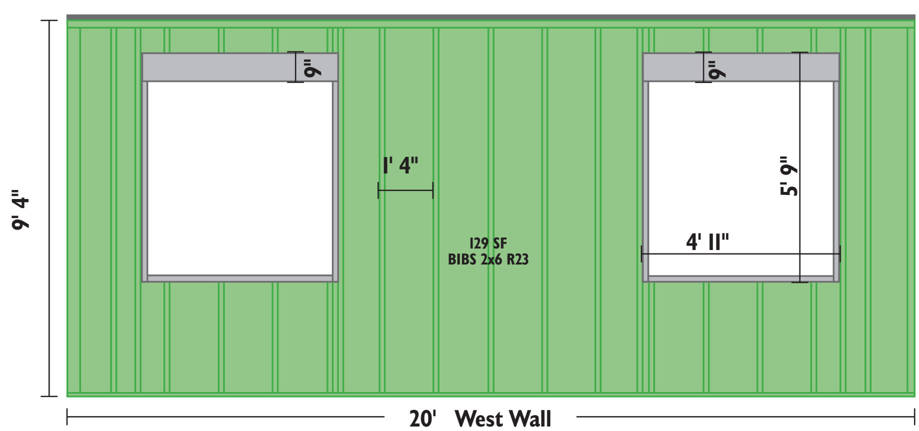
■ BIBS 2x6 R23 - Q1 130 SR; Q2 187 SF



■ BIBS 2x6 R23 - Q1 130 SR; Q2 196 SF



■ BIBS 2x6 R23 - Q1 129 SR; Q2 186 SF



Sample Small Office for ASPE Salt Lake City, Utah	Estimator	John S. Project Estimate Summary	Bid Date Date Prepared		07/31/16 07/31/16					
Item **Material**		**Description**	**Quantity**	**Unit**	**Unit Price**	**Ext. Price**			**BIBS R23** 537	**Mats** SF
Blowing Wool for BIBS		2 x 6 Studs 1.5lb. Density BIBS R23	537.00	SF						
	10%	Extra Blowing Wool for Waste	53.70	SF						
		Total SF of Blowing Wool	**590.70**	**SF**						
Bags of Blowing Wool - Rounded Up	45.8	Max Coverage Per Bag Bags Needed	13.00	Bags	$22.00	$286.00			$286.00	TRUE
Netting	766	SF of Netting - Add 10% Waste/Overlap	842.60	SF	$0.05	$42.13			$42.13	TRUE
4mil Visqueen	766	Boxes of Visqueen 10 x 100 - 1,000 SF	1	EA	$21.88	$21.88			$21.88	TRUE
Staples for Netting - Box of 5,000	100	SF/Box	8	EA	$2.50	$20.00			$20.00	TRUE
Staples for Visqueen - Box of 5,000	2,500	SF/Box	1	EA	$1.50	$1.50			$1.50	TRUE
							$371.51			
			SUBTOTAL			**$371.51**			$371.50	TRUE
Freight, Rental										
		Jobsite Direct Delivery	0	Lot	$0.00	$ -			$ -	TRUE
		Rental Equipment 27" Scissor Lift	0	Month	$1,150.00	$ -			$ -	TRUE
		Scaffolding Rental	0	Month	$300.00	$ -	$ -		$ -	TRUE
		Miscellaneous								
			SUBTOTAL			**$371.51**			$371.50	TRUE
Tax			Tax in Decimals		0.0685	6.85%			6.85%	TRUE
			Total Tax			$25.45			$25.45	TRUE
			SUBTOTAL			**$396.96**			$396.96	TRUE
Subsistance	$75.00	/Man Day		MD	$225.00	$ -			$0.00	TRUE
Labor	**SF/LF/EA**	Crew Day	330.00	MD	$110.00		**Per Man Per Day**			
Loading Truck	1.00	EA	0.10	MD	$110.00	$11.00	0.10	MD	$11.00	TRUE
Travel To and From Jobsite	1.00	EA	0.40	MD	$110.00	$44.00	0.40	MD	$44.00	TRUE
Jobsite Set-Up/Shake-Out	1.00	EA	0.20	MD	$110.00	$22.00	0.20	MD	$22.00	TRUE
Netting Installation	766.00	SF	0.48	MD	$110.00	$52.66	1,600.00	SF	$52.66	TRUE
BIBS Installation	13.00	Bags	0.33	MD	$110.00	$35.75	40.00	Bags	$35.75	TRUE
Visqueen Installation	766.00	SF	0.31	MD	$110.00	$35.70	2,500.00	SF	$33.70	TRUE
Jobsite Clean-Up	1.00	EA	0.10	MD	$110.00	$11.00	0.10	MD	$11.00	TRUE
Includes:			1.91	MDs						
R23 1.5lb. Density BIBS, Installed			0.70	3	**Man Crew Days**		**Labor SubTotal**			
4mil Visqueen, Installed			0.20	Weeks on jobsite			$210.12			
			COST SUBTOTAL			**$607.07**			**$607.07**	TRUE
		Mark-Up	Mark-Up in Decimals			0.4	40.0%		0.4	TRUE
			Total Mark-Up			$242.83	**Mark Up**		$242.83	TRUE
Exclusions:			**SUBTOTAL WITH MARK-UP**			**$849.90**			**$849.90**	TRUE
Mock-Up		**Contingency**	Contingency in Decimals			$0.02	2.00%		$0.02	TRUE
Bond			Total Contingency			$17.00	**Contingency**		$17.00	TRUE
			SUBTOTAL WITH MARK-UP			**$866.90**			**$866.90**	TRUE
		Bond	Bond Cost in Decimals			0	0.00%		0	TRUE
		If Bond is needed, Add 1%	Total Bond Cost			$ -	**Bond Cost**		$ -	TRUE
			TOTAL			**$866.90**			**$866.90**	TRUE
Total Price Per SF	$1.61									
Labor Per SF	$0.39		**Quoted PRICE**			$900.00				

Section 10 : Glossary / Terminology

BIBS – An acronym for Blown In Blanket System, an insulating system using netting and loose insulation fibers, or blowing wool, to fill cavities of walls, floors, attics, and cathedral ceilings.

Blowing Wool – loose fiberglass fibers, similar to the fiberglass used in batt and blanket insulation, but not bound together with glues or binders, so it can be installed with a blowing machine and hose.

CSI 2004 Master Format – The Construction Specification Institute Master Format is a master list of Divisions, and Sections used to organize project requirements.

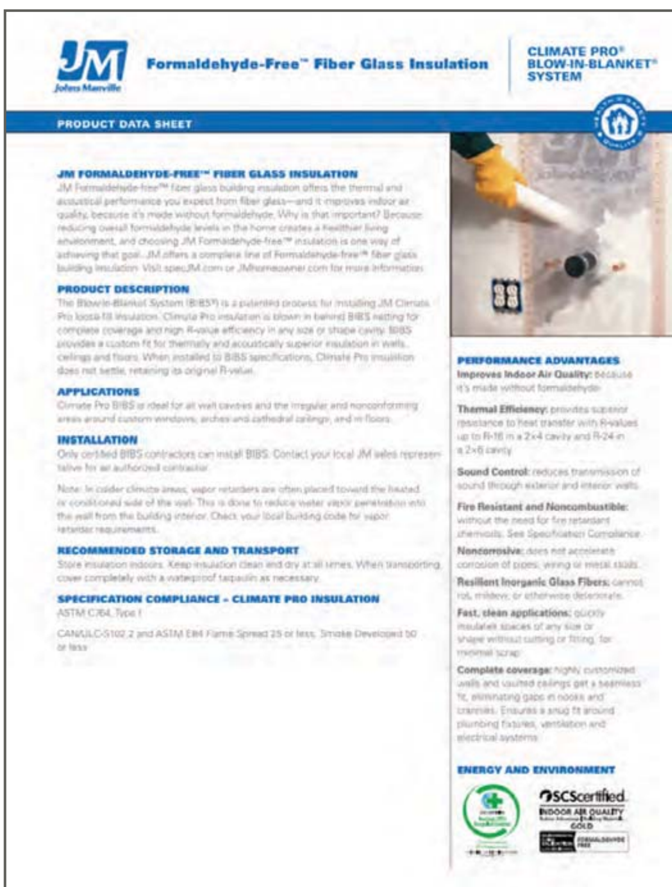
R-Value – a unit of measurement of thermal resistance of a product such as insulation. The higher the R-value, the more resistant the insulation is to heat transfer.

Visqueen – a brand name commonly used when referring to polyethylene plastic sheeting, used as a vapor barrier.

Section 11 : References

1. Blowing Wool Product Data Sheet / BIBS Coverage Chart used with permission of Johns Manville. The document is available for download from the www.jm.com website.

The manufacturers Product Data Sheet / BIBS Coverage Chart1 can be used to determine the quantity of bags needed for any required density, thickness or R-value.



Formaldehyde-Free™ Fiber Glass Insulation

CLIMATE PRO® BLOW-IN-BLANKET® SYSTEM

PRODUCT DATA SHEET

JM FORMALDEHYDE-FREE™ FIBER GLASS INSULATION

PRODUCT DESCRIPTION

APPLICATIONS

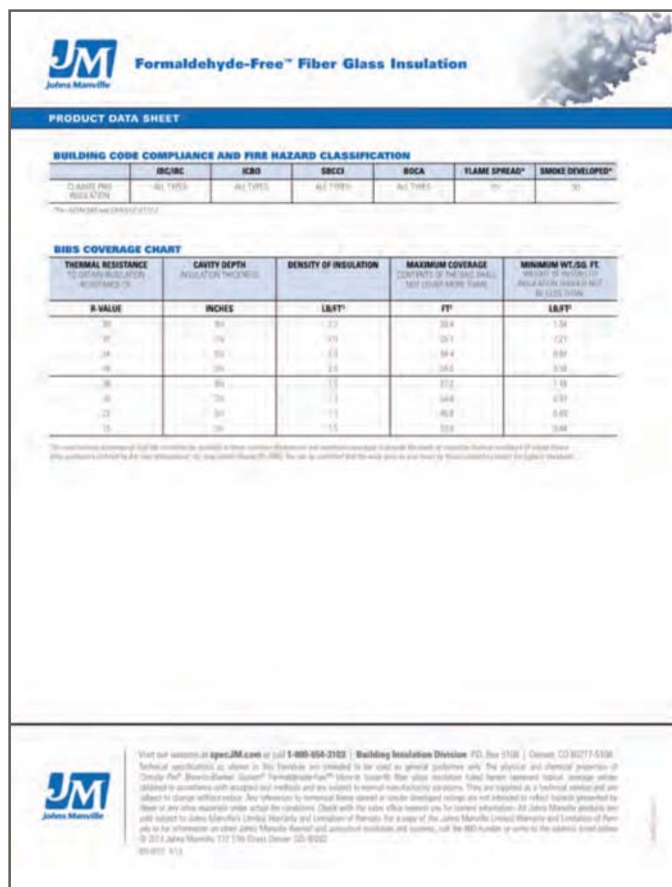
INSTALLATION

RECOMMENDED STORAGE AND TRANSPORT

SPECIFICATION COMPLIANCE – CLIMATE PRO INSULATION

PERFORMANCE ADVANTAGES

ENERGY AND ENVIRONMENT



Formaldehyde-Free™ Fiber Glass Insulation

PRODUCT DATA SHEET

BUILDING CODE COMPLIANCE AND FIRE HAZARD CLASSIFICATION

BIBS COVERAGE CHART