

Annex VII

Conclusions and recommendations of the World Bank OORG Foam Density Report 2000

1. The information and guidance contained in the World Bank OORG Foam Density Report 2000 of 25 June 2000 should be shared with all the implementing agencies.
2. Rigid polyurethane insulation foam projects should be based on the definitions of market segments as defined in Table 1.
3. For each MLF project the overall densities of the foams in the baseline case and with the alternative technologies should be determined using ISO 845. This will enable the data bank to be expanded and enhanced.
4. The density changes applied in rigid polyurethane insulating foam projects should follow the values listed in Table 3.
5. Where enterprises are operating, in the baseline case, at lower densities than those listed in Table 3 the percentage increases in density should be applied.
6. For rigid polyurethane foam projects where incremental operating costs are given for two years the first year should be based on the “start-up” density and the second year on the “mature” density. For those projects where incremental operating costs are met for six months then the “start-up” density should be used.
7. For flexible moulded foam, where the technology to replace CFC-11 is invariably CO₂ (water) blown there is no increase in density. However, formulations might need to be changed to maintain performance/OEM specifications, but no general rules can be drawn up regarding formulation changes.
8. For integral skin products, this segment is best considered on a case by case basis.
9. The Working Group should be reconvened when it is deemed necessary so that it can update its findings.

And some concluding remarks:

This study is extremely important for the cost effective phase-out of ODS in foam projects. The TOR was broad in concept and this report attempts to present the findings in a clear and concise fashion.

The data input was based on two sources. The first was from a study of data from MLF projects provided by UNDP and The World Bank. The second was the experience (a total of 146 years) and on-going learning of the members of the Foams Working Group. Both sources are invaluable.

It is inevitable that further information would have enhanced the data bank but is unlikely to have changed the conclusions.

TABLE 1 – RIGID POLYURETHANE FOAM SEGMENTATION

SEGMENT	SUB-SEGMENT	COMMENTS
THERMOWARE	Picnic boxes	e.g. as made by Rubbermaid and Coleman
	Insulated food dishes & bottles	
PIPE INSULATION	Pipe sections	Moulded sections
		Sections cut from blocks
	Pipe-in-pipe	For DCH (District heating pipes)
DISCONTINUOUS BOARDS & BLOCKS	Boards	
	Blocks	Used for several applications including pipe sections & panels
CONTINUOUS BOARDS & BLOCKS	Flexible-faced laminates/boardstock	Major insulation product in developed countries
	Blocks	Rigid slabstock used for pipe sections and panels, etc.
DOMESTIC REFRIGERATORS & FREEZERS		
COMMERCIAL REFRIGERATORS & FREEZERS	Vending machines	Self-service can drink dispensers
	Visi-coolers	Glass-fronted drink coolers
	Display cases	Used in retail outlets
	Chest freezers	Used in retail outlets
	Walk-in/step-in coolers/freezers	Storage in supermarkets, typically made from discontinuously-made sandwich panels
CONTINUOUS PANELS		For cladding, warehouses, cold stores, industrial buildings
DISCONTINUOUS PANELS		Uses as for continuous panels plus doors and commercial refrigeration
SPRAY FOAMS	Walls	Interior & exterior walls
	Roofs	For new and renovation applications
	Pipes and Tanks	For hot and cold applications

For non-insulating polyurethane foams the sub-segments are:

TABLE 2 – FLEXIBLE MOULDED FOAM SEGMENTATION

SEGMENT	SUB-SEGMENTS	COMMENTS
FLEXIBLE MOULDED FOAM – TRANSPORTATION	Seat backs	All follow specifications of the OEMs
	Seat cushions	
	Headrests	
	Saddles	For motorcycles
FLEXIBLE MOULDED FOAM – FURNITURE		
FLEXIBLE INTEGRAL SKIN FOAMS – TRANSPORTATION	Steering Wheels, armrests	
	Fascias	
	Bicycle saddles	
RIGID INTEGRAL SKIN	Furniture	Typically wood imitation mouldings
	Electrical and electronic cases	

TABLE 3 – DENSITIES FOR RIGID POLYURETHANE FOAMS

SEGMENT	SUB-SEGMENT	BASELINE DENSITY	ALTERNATIVE TECHNOLOGY	START-UP DENSITY (λ %)	MATURE DENSITY (λ %)
THERMOWARE	Picnic boxes	32-34	HCFC 141b	35-37 (9)	32-34 (0)
	Insulated dishes	32-34	HCFC 141b	35-37 (9)	32-34 (0)
PIPE INSULATION	Pipe sections	33-35	HCFC 141b	35-37 (6)	34-36 (3)
	Pipe-in-pipe	70-80	HCFC 141b & pentane	70-80 (0)	70-80 (0)
DISCONTINUOUS BOARDS & BLOCKS	Boards	35-37	HCFC 141b	38-40 (8)	36-38 (3)
	Blocks	33-34	HCFC 141b	36-37 (9)	34-35 (3)
CONTINUOUS BOARDS	Boards	30-32	HCFC 141b, pentane	33-35 (10) 35-37 (16)	31-33 (3) 34-36 (13)
DOMESTIC REFRIGERATOR/FREEZERS		31-33	Cyclopentane Cyclo/iso pentane HCFC 141b	36-38 (16) 34-36 (10) 35-37 (13)	34-36 (10) 34-35 (8) 33-35 (6)
COMMERCIAL REFRIGERATORS & FREEZERS	Vending machines	33-35	HCFC 141b	36-38 (9)	35-37 (6)
	Visi-coolers	33-35	HCFC 141b	36-38 (9)	35-37 (6)
	Display cases	36-38	HCFC 141b	38-40 (5)	37-39 (3)
	Chest freezers	36-38	HCFC 141b	38-40 (5)	37-39 (3)
	Walk-in/step-in coolers/freezers	41-44	HCFC 141b	43-45 (4)	41-44 (0)
CONTINUOUS PANELS		40-42	HCFC 141b, Pentane	42-44 (5)	40-42 (0)
DISCONTINUOUS PANELS		41-44	HCFC 141b, Pentane, HFC 134a	43-45 (4)	41-44 (0)
SPRAY FOAMS	Walls	32-35	HCFC 141b	34-37 (6)	33-36 (3)
	Roofs	48-50	HCFC 141b	48-50 (0)	48-50 (0)
	Pipes & tanks	32-35	HCFC 141b	34-37 (6)	33-36 (3)