**Economic Commission for Europe**

Inland Transport Committee

**Working Party on the Transport of Perishable Foodstuffs** **14 July2014**

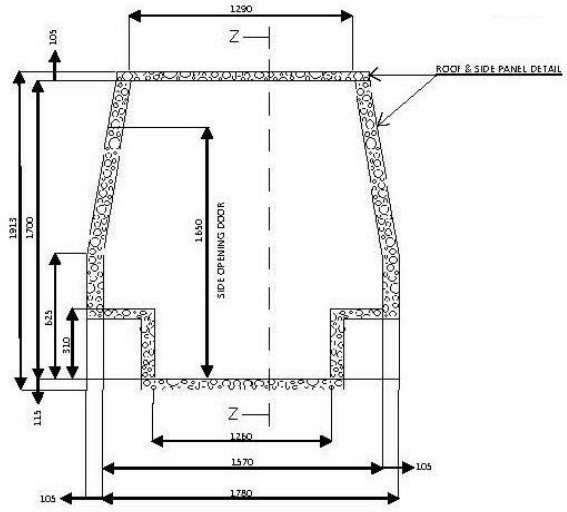
**Seventieth session**
Geneva, 7-10 October 2014
**Item 5 (a) of the provisional agenda**
**Proposals of amendments to the ATP: Pending proposals**

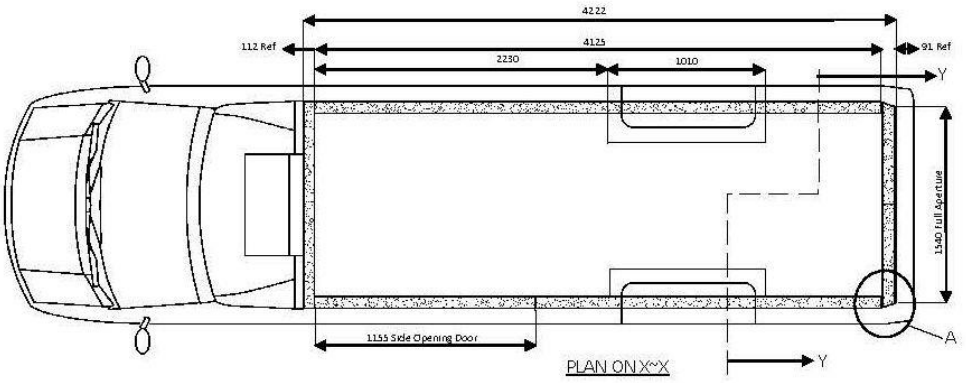
# Informal document from the United Kingdom to support the proposal for the Interpretation of external surface area measurement for panel vans

## Examples

Using a van recently tested in the UK, the three methods are demonstrated using figures 1 to 5 which are intended to be included in the ATP Handbook.

The manufacturer in this case was able to supply the drawing of the insulated panel van but was unable to provide calculations of the internal and external surface areas.

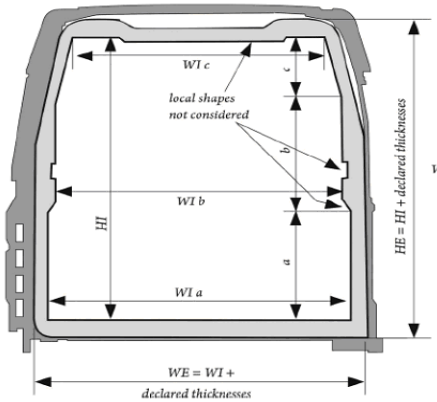





## Method A

| | | | | | | Internal | | | | | | | External |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Roof | | 4.125 | | | | | Roof | | 4.222 | | | | |
| | | | | 1.29 | | 5.32125 | | | | | 1.5 | | 6.333 |
| Floor | | 4.125 | | | | | Floor | | 4.222 | | | | |
| | | | | 1.57 | | 6.48 | | | | | 1.78 | | 7.52 |
| Sides | | 4.125 | | | | | Sides | | 4.222 | | | | |
| | | | | 1.7 | | 14.025 | | | | | 1.913 | | 16.15337 |
| Bulkhead | | | | | | | Bulkhead | | | | | | |
| | | 1.29 | | | | | | | 1.5 | | | | |
| | | | 1.70 | | | 1.72 | | | | 1.91 | | | 2.55 |
| | | 1.57 | | | | | | | 1.78 | | | | |
| Door | | | | | | | Door | | | | | | |
| | | 1.29 | | | | | | | 1.5 | | | | |
| | | | 1.7 | | | 1.72 | | | | 1.913 | | | 2.55 |
| | | 1.57 | | | | | | | 1.78 | | | | |
| | | | | | Si | 29.27 | | | | | | Se | 35.11 |
| with wheel arches | | 0.1922 | | | Si | 29.46 | | | | | | Se | 35.30 |

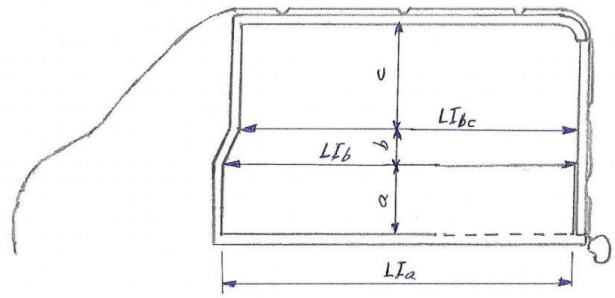
## Method B (excluding wheel arches)




$$WI = \frac{WIa \times a + WIb \times \left(b + \frac{c}{2}\right) + WIc \times \frac{c}{2}}{a + b + c}$$

$$\text{Mean declared thicknesses (mm)} < \frac{25}{K}$$

| | |
|---|---|
| Wia | 1.57 |
| Wib | 1.57 |
| Wic | 1.29 |
| a | 0.31 |
| b | 0.315 |
| c | 1.075 |
| **WI** | **1.481471** |
| Declared Thickness | 0.22 |
| **WE** | **1.701471** |




$$LI = \frac{(LI_a \times a) + (LI_b + LI_c)/2 \times b + (LI_c \times c)}{a + b + c}$$

$$LE = LI + \text{mean declared thicknesses}$$

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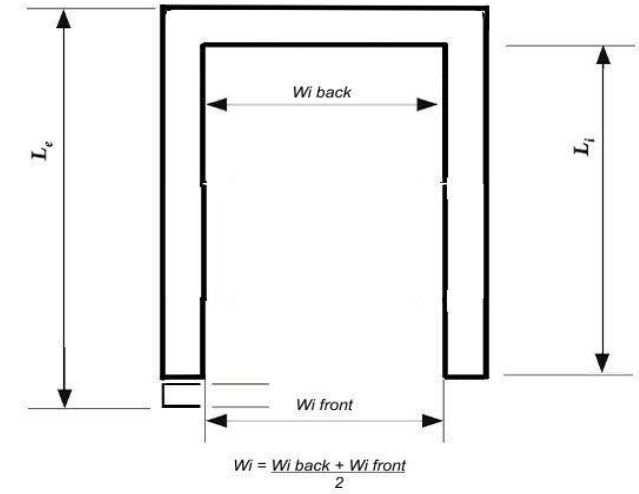
| | |
|---|---|
| Lia | 4.125 |
| Lib | 4.125 |
| Lic | 4.125 |
| a | 0.31 |
| b | 0.315 |
| c | 1.075 |
| **LI** | **4.125** |
| Declared Thickness | 0.203 |
| **LE** | **4.328** |




$$Wi = \frac{Wi\ back + Wi\ front}{2}$$

| | |
|---|---|
| Wiback | 1.57 |
| Wifront | 1.57 |
| **Wi** | **1.57** |
| Declared Thickness | 0.21 |
| **We** | **1.78** |

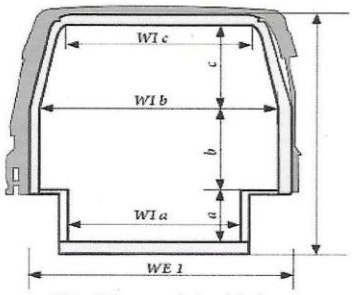
## Method C (excluding wheel arches)

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Wia | 1.57 | Lia | 4.125 | Wib | 1.57 | | | | | | | | |
| Wib | 1.57 | Lib | 4.125 | Wif | 1.57 | | | | | | | | |
| Wic | 1.29 | Lic | 4.125 | | | | | | | | | | |
| a | 0.31 | a | 0.31 | | | | | | | | | | |
| b | 0.315 | b | 0.315 | | | | | | | | | | |
| c | 1.075 | c | 1.075 | | | | | | | | | | |
| | | | | | | Si | Se | S | W | Delta T | k | Lambda | d |
| WI | 1.481471 | LI | 4.125 | Wi | 1.57 | 29.37 | | | 300 | 25 | 0.409 | 0.025 | 0.0612 |
| WE | 1.6039 | LE | 4.2474 | We | 1.6924 | 29.37 | 33.43 | 31.34 | 300 | 25 | 0.383 | 0.025 | 0.0653 |
| WE | 1.6120 | LE | 4.2556 | We | 1.7006 | 29.37 | 33.68 | 31.45 | 300 | 25 | 0.382 | 0.025 | 0.0655 |
| WE | 1.6125 | LE | 4.2560 | We | 1.7010 | 29.37 | 33.69 | 31.46 | 300 | 25 | **0.381** | 0.025 | 0.0655 |

## Results from all three methods (excluding wheel arches)

| | Si | Se | S | W | Delta T | k |
|---|---|---|---|---|---|---|
| **Method A** | 29.27 | 35.11 | 32.05 | 300 | 25.00 | **0.374** |
| **Method B** | 29.37 | 35.79 | 32.42 | 300 | 25.00 | **0.370** |
| **Method C** | 29.37 | 33.69 | 31.46 | 300 | 25.00 | **0.381** |

## Method B (Including wheel arches)



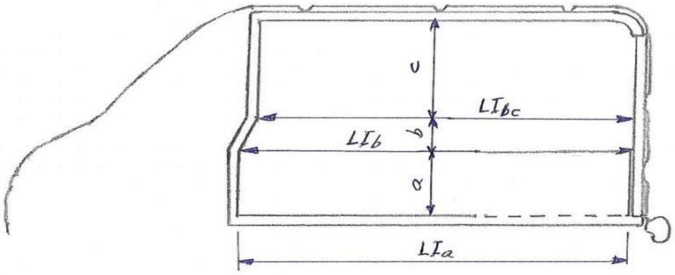

*WE = WI + mean declared thicknesses*

$$WI = \frac{((WIbxb)+(WIbxc)-((WIb-WIc)xc)+(WIbxa)+(2x((WIb-WIa)xa)))}{(a+b+c)}$$

key

| | |
|---|---|
| $W_{Ia}$ | internal width between the wheel arches |
| $W_{Ib}$ | internal width above the wheel arches |
| $W_{Ic}$ | internal width of the roof |
| *a* | internal height of the wheel arches |
| *b* | internal height above the wheel arches |
| *c* | internal height above the wheel arches where the side wall width ends |

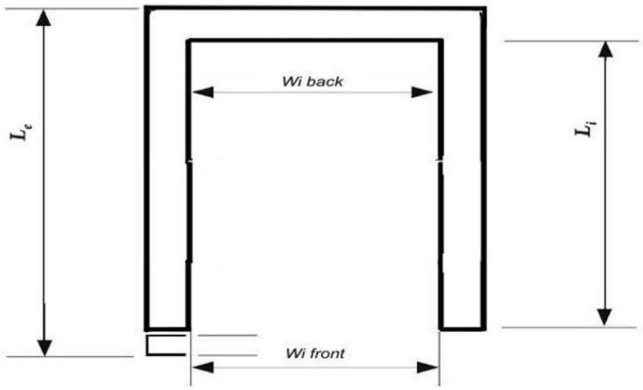
| | |
|---|---|
| Wia | 1.26 |
| Wib | 1.57 |
| Wic | 1.29 |
| a | 0.31 |
| b | 0.315 |
| c | 1.075 |
| | |
| **WI** | **1.506** |
| Declared Thickness | 0.22 |
| **WE** | **1.726** |




$$LI = \frac{((LIa \times a) + (LIb + LIc)/2 \times b + (LIc \times c))}{(a + b + c)}$$

LE = LI + mean declared thickness

| | |
|---|---|
| | 3.115 |
| Lia | 4.125 |
| Lib | 4.125 |
| Lic | 4.125 |
| a | 0.31 |
| b | 0.315 |
| c | 1.075 |
| | |
| **LI** | **4.125** |
| Declared Thickness | 0.203 |
| **LE** | **4.328** |




$$Wi = \frac{(Wi\ back + Wi\ front)}{2}$$

We = Wi + mean declared thickness

| | |
|---|---|
| Wiback | 1.57 |
| Wifront | 1.57 |
| | |
| **Wi** | **1.57** |
| Declared Thickness | 0.21 |
| **We** | **1.78** |

## Method C (including wheel arches)

| | | | | | |
|---|---|---|---|---|---|
| Wia | 1.26 | Lia | 4.125 | Wib | 1.57 |
| Wib | 1.57 | Lib | 4.125 | Wif | 1.57 |
| Wic | 1.29 | Lic | 4.125 | | |
| a | 0.31 | a | 0.31 | | |
| b | 0.315 | b | 0.315 | | |
| c | 1.075 | c | 1.075 | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Si | Se | S | W | Delta T | k | Lambda | d |
| WI | 1.506 | LI | 4.125 | Wi | 1.57 | 29.78 | | | 300 | 25 | 0.403 | 0.025 | 0.0620 |
| WE | 1.6301 | LE | 4.2491 | We | 1.6941 | 29.78 | 33.77 | 31.71 | 300 | 25 | 0.378 | 0.025 | 0.0661 |
| WE | 1.6381 | LE | 4.2571 | We | 1.7021 | 29.78 | 34.02 | 31.83 | 300 | 25 | 0.377 | 0.025 | 0.0663 |
| WE | 1.6386 | LE | 4.2576 | We | 1.7026 | 29.78 | 34.03 | 31.83 | 300 | 25 | **0.377** | 0.025 | 0.0663 |

## Results from all three methods (including wheel arches)

| | Si | Se | S | W | Delta T | k |
|---|---|---|---|---|---|---|
| **Method A** | 29.46 | 35.30 | 32.25 | 300 | 25.00 | **0.372** |
| **Method B** | 29.78 | 36.22 | 32.84 | 300 | 25.00 | **0.365** |
| **Method C** | 29.78 | 34.03 | 31.83 | 300 | 25.00 | **0.377** |