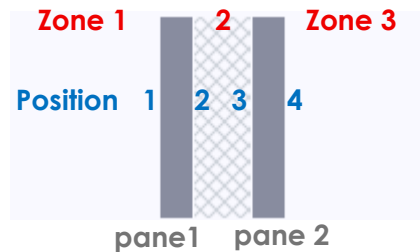


## Example

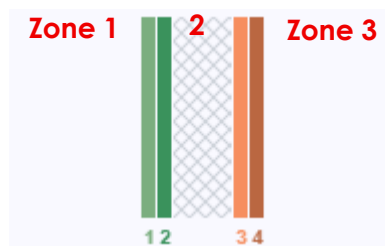
Radiation properties typically provided by glazing manufacturers are defined differently than the convention in Physibel applications. This document illustrates with an example how radiation properties are defined within BISTRA and VOLTRA.

The figure below shows the schematic layout of the glazing system and the manufacturer's data.



		<b>glazing pane 1</b>		<b>glazing pane 2</b>	
<i>Position</i>		1	2	3	4
<i>Solar transmission factor</i>	$\tau$	0.83		0.58	
<i>Solar reflection factor</i>	$\rho$	0.08	0.08	0.30	0.24
<i>Solar absorption factor</i>	$\alpha$	0.09	0.09	0.12	0.18
<i>Infrared emissivity</i>	$\epsilon_{IR}$	0.837	0.837	0.04	0.837

In the Physibel software, radiation properties are linked to the material adjacent to the relevant zone. In order to realise different properties on each side, the pane can be divided in two colours:



In the Physibel software, the solar transmission factor  $\tau_s$  is defined after subtracting reflection  $\rho$ . The input value of  $\tau_s$  in the Physibel software can be calculated from the solar properties provided by the manufacturer.

$$\tau_s = \frac{\tau}{1 - \rho}$$

Thus, the Physibel glazing input becomes:

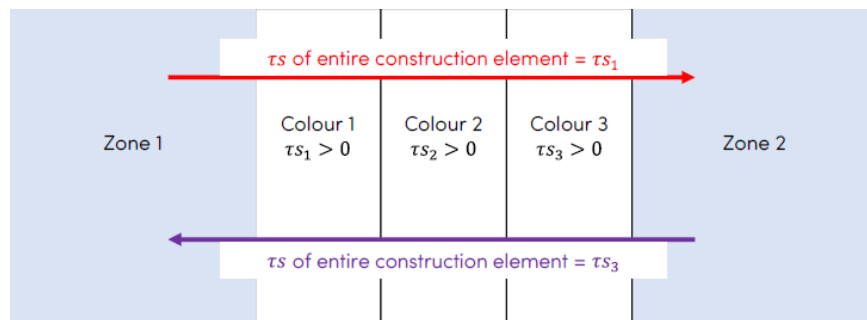
		glazing pane 1		glazing pane 2	
		1	2	3	4
Solar transmission factor	$\tau_s$	0.90	0.90	0.83	0.76
Solar reflection factor	$\rho_s$	0.08	0.08	0.30	0.24
Infrared emissivity	$\varepsilon_{IR}$	0.837	0.837	0.04	0.837

## Implementation

The solar transmission factor of the first encountered colour (MATERIAL) is applied along the entire path of the solar radiation until another zone or material with  $\tau_s = 0$  is reached. In other words, once radiation enters the construction from a particular zone, the transmission factor  $\tau_s$  associated with the first colour governs the transmission of the entire construction element in that direction. The solar reflection factor  $\rho_s$  and the solar transmission factor  $\tau_s$  are applied only at surfaces that are in contact with a zone. A "zone" in this context is either:

- a solar zone (e.g. BC\_SIMPL, BC\_SKY), or
- an internal zone with detailed radiation modelling (e.g. BC\_FREE, BC\_SKY, BC\_NOSKY, or TRANSMAT).

For further details, refer to the BISTRA and VOLTRA manuals.



## Physibel Toolbox Calculation

[Physibel Online Toolbox](#) can help pre-processing the solar radiation properties for BISTRA and VOLTRA.

**Class Radiation Properties**

Manufacturer Data

Glazing Type: Double

Layer	$\tau$	$\rho_1$	$\alpha_1$	$\varepsilon_1$	$\rho_2$	$\alpha_2$	$\varepsilon_2$
1	0.83	0.08	0.09	0.837	0.08	0.09	0.837
2	0.58	0.3	0.12	0.04	0.24	0.18	0.837

Physibel Data

Colour	$\tau_{Physibel}$	$\rho$	$\varepsilon$
1	0.9022	0.0800	0.8370
2	0.9022	0.0800	0.8370
3	0.8286	0.3000	0.0400
4	0.7632	0.2400	0.8370