

8. SPECIAL CASES

8.12 Garage / Rolling Doors

Garage doors and rolling doors are modeled differently than window products because there are more opaque sections to be modeled in THERM. The procedures for modeling doors are included in *NFRC 100*: and that document should be reviewed in detail before modeling any entry door systems.

As with all other product modeling, all relevant cross sections must be modeled in THERM. Detailed illustrations of sections, elevations and model details, as well as the area-weighting methodology for calculating the whole product properties (based on THERM results from of each cross section) are defined in NFRC 100-2004. The information in this manual covers the specific modeling procedures for the THERM cross-sections.

NFRC has defined nine regions within a door that need to be modeled. These regions include:

- Frame Area
- Lite Frame Area
- Divider area
- Edge-of-divider area
- Edge-of-Lite Area
- Center-of-lite area
- Door Core Area
- Panel Area
- Edge-of-Panel Area

NFRC 100 contains several figures which illustrate the location of the door sections to be modeled in THERM.

When modeling glazing options with caming, the NFRC default caming can be used.

A spreadsheet must be used to do the door area-weighting from the THERM files, because the current version of WINDOW does not area-weight doors. In THERM, the U-factor Surface Tags can have any name and as many U-factor Surface Tags can be defined as are needed to accurately describe the model. (See Section 6.2.4, "Define U-factor Surface Tags in the *THERM User's Manual*"), so define as many U-factor Surface Tags as needed and name them descriptively.

8.12.1. Sectional Garage Door (Insulated and Non-Insulated)

The overall product U-factor is calculated based on the area weighted average of the U-factor of each component of the door. The components used for area weighting a sectional garage door are:

- Top Rail
- Bottom Rail
- End Stile
- Meeting Rail
- Door Panel Core
- Edge-of-Lite
- Center-of-Lite

The U-factor of each component is calculated using two dimensional heat transfer software THERM. The sectional garage doors with embossed or raised panels are not covered in this section. However, refer to the

entry door section for the principles of modeling embossed or raised panels which can then be applied to sectional doors.

The boundary condition details and other modeling assumptions used on the simulation models for door components are discussed in the following sections.

8.12.1.1. Top Rail Model

A nominal 2x4 wood block is used in the Top Rail Model as shown in the figure below. The torsion spring assembly, and any non-continuous hardware, shall not be included in this model. The boundary condition (BC) type and U-factor tags used in the model are illustrated in the figure below.

THERM File Properties:

- **Cross Section Type:** Head
- **Gravity Arrow:** Down

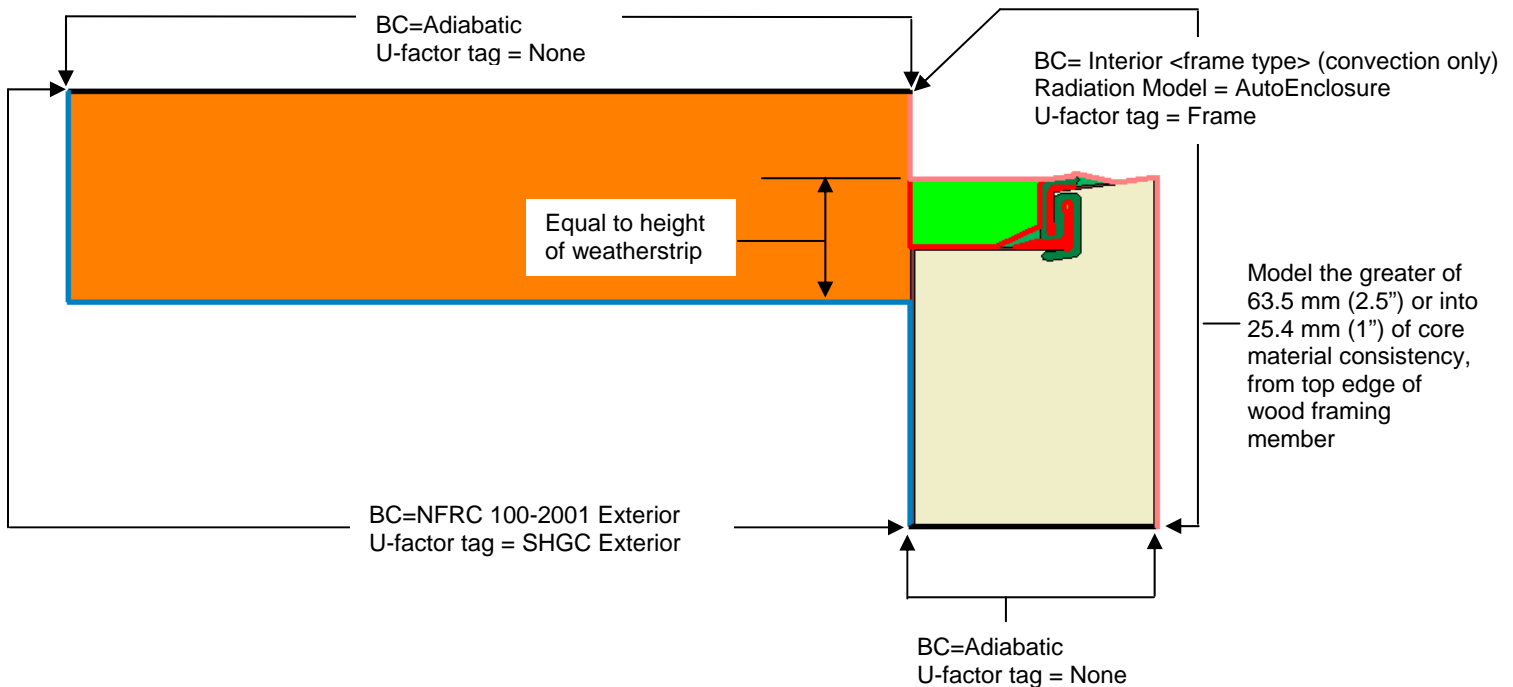


Figure 8-1 Top Rail Model.

8.12.1.2. Bottom Rail Model

A nominal 2 x 6 wood block is used in the bottom rail model of the garage door. Refer to the figure below for the boundary conditions and U-factor tag tags.

THERM File Properties:

- **Cross-section Type:** Sill
- **Gravity Arrow:** Down

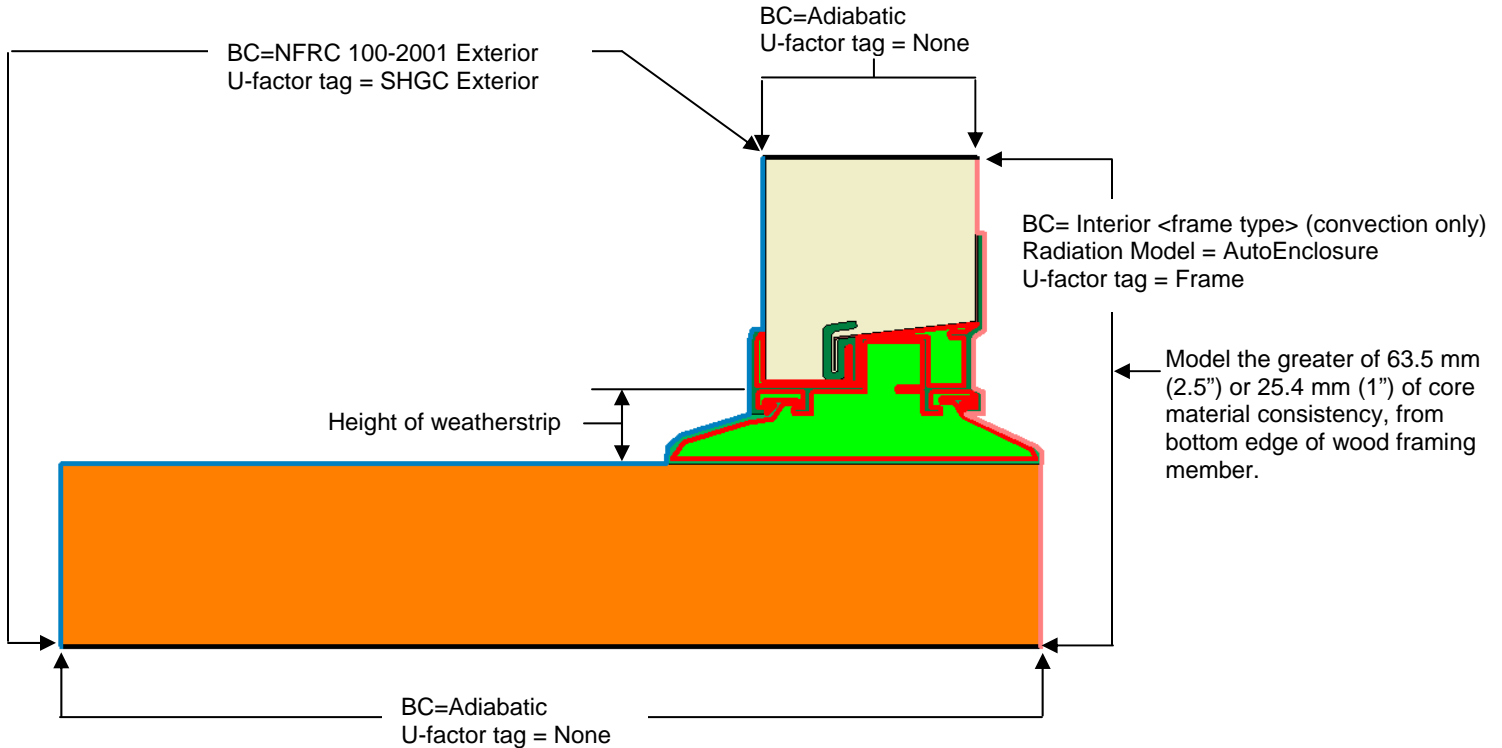


Figure 8-2 Bottom Rail Model.

8.12.1.3. End Stile Model

A nominal 2x4 wood block is used in the End Stile Model. The projected frame dimension shall incorporate a 1" uniform section of the garage door panel. Any non-continuous hardware, such as rollers, shall not be included in the model. The boundary condition type and the U-factor tag used on the End Stile model are shown in the figure below.

THERM File Properties:

- **Cross-section Type:** Jamb
- **Gravity Arrow:** Into the Screen

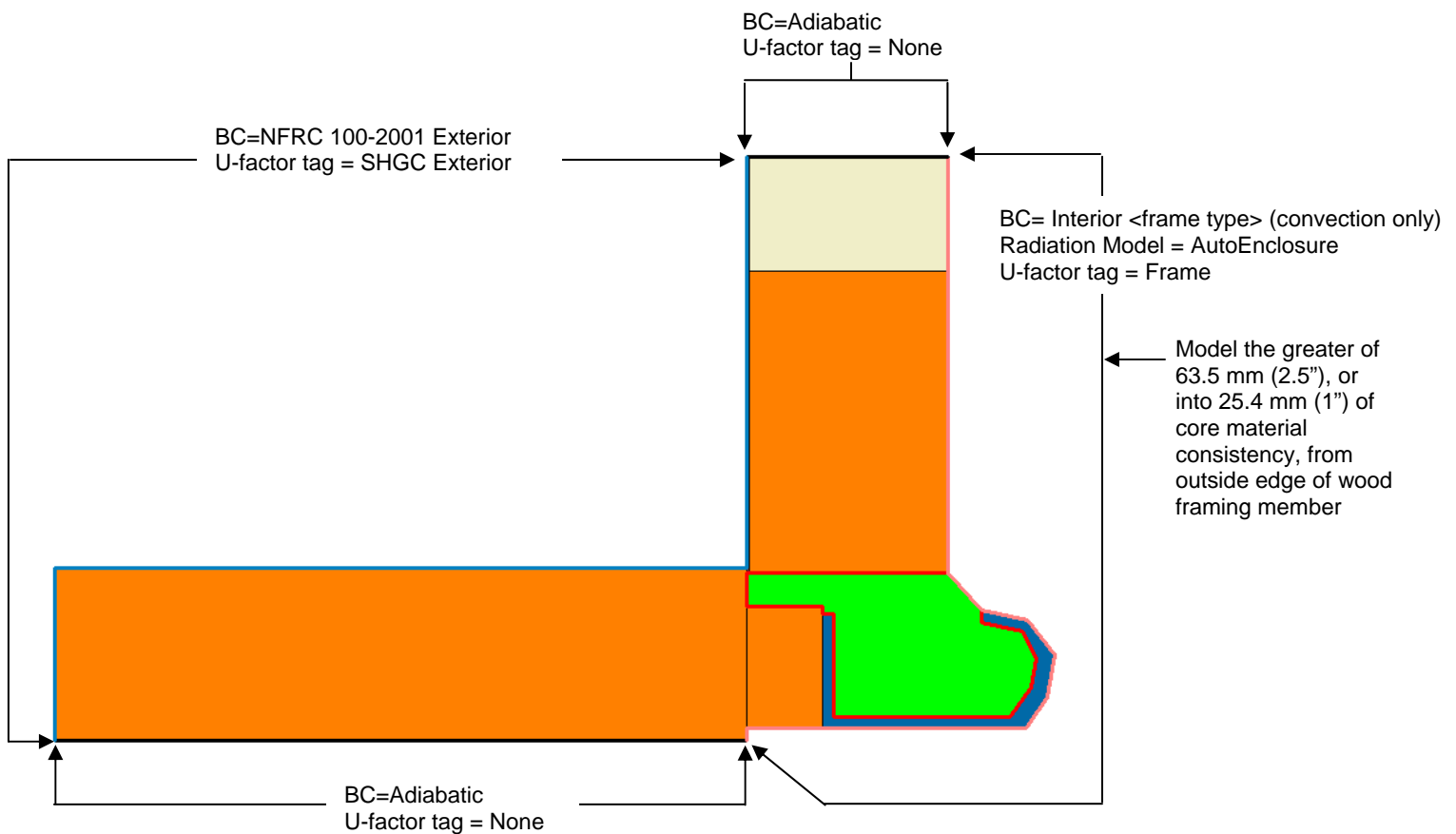


Figure 8-3 End Stile Model.

8.12.1.4. Meeting Rail / Door Panel Core Model

The Meeting Rail Model is combined with the Door Panel Core Model, as shown in the figure on the following page. The meeting rail model shall include 63.5 mm (2.5") section of the each joining panel. The projected dimension of the panel core section shall be equal to:

$$([\text{Height of the Panel}] - 5") / 2$$

THERM File Properties:

- **Cross-section Type:** Horizontal Meeting Rail
- **Gravity Arrow:** Down

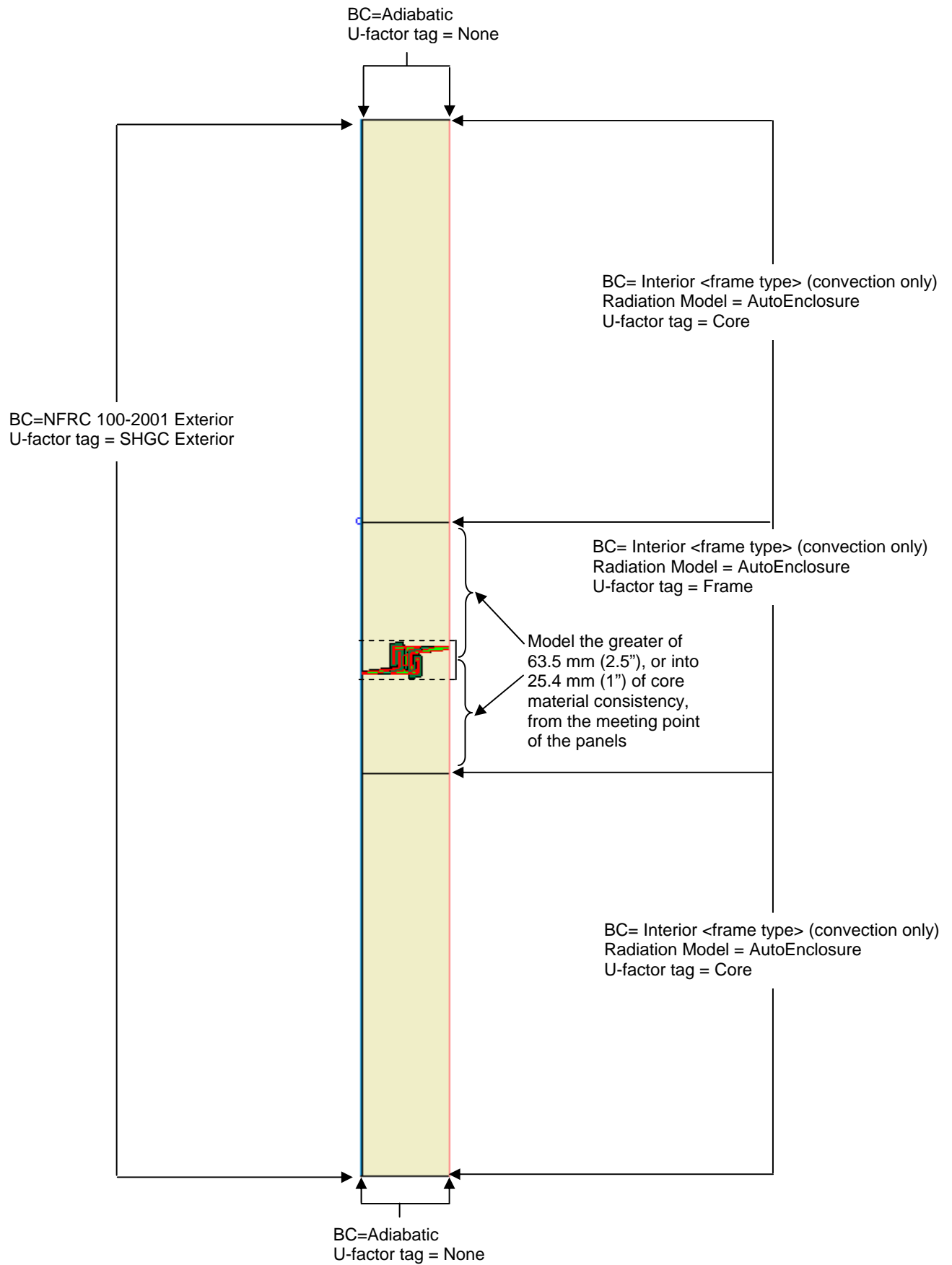


Figure 8-4 Meeting Rail and Door Panel Core Model.

8.12.1.5. Edge-of-Lite Model

The procedure for modeling edge-of-lite (edge-of-glazing) properties is the same procedure as for entry doors. See the entry door procedure in this manual for detailed instructions for modeling these cross-sections.

Below is a sample THERM cross section for the Door Lite Sill. See Section 9.5.4 for the complete example for Entry Doors.

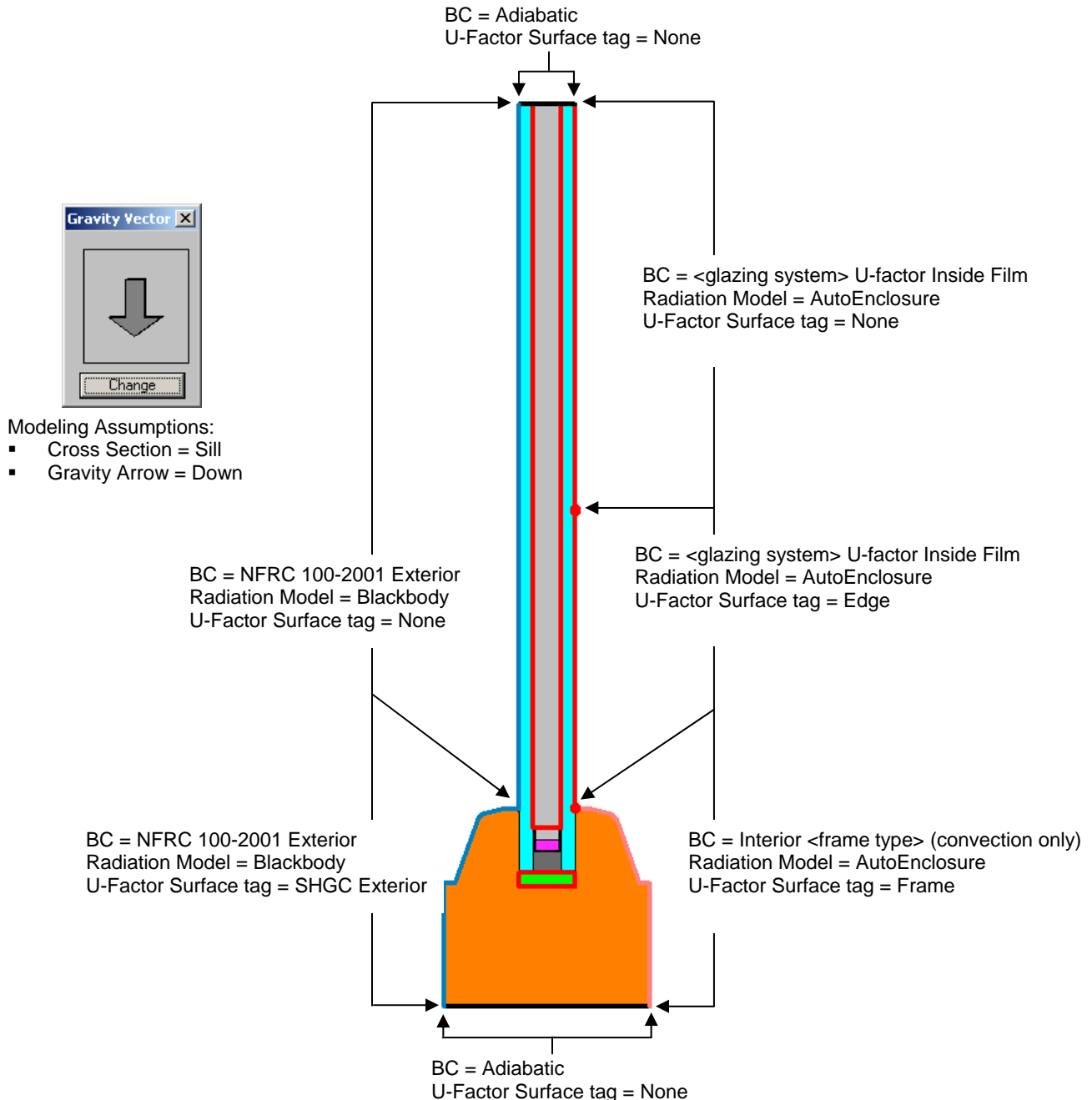


Figure 8-5 Edge-of-Lite model for the garage door lite.

8.12.2. Rolling Door

The overall product U-factor is calculated based on area weighted average of various component's U-factor. The components used for area weighting a rolling door are:

- Top Rail
- Bottom Rail
- End Stile
- Door Core

The U-factor of each component is calculated using two dimensional heat transfer software THERM.

The boundary condition details and other modeling assumptions used on the simulation models for door components are discussed in the following sections.

8.12.2.1. Top Rail Model

A nominal 2x4 wood block is used in the Top Rail Model as shown in the figure below. The torsion spring assembly, and any non-continuous hardware, shall not be included in this model. The boundary conditions (BC) and U-factor tags used in the model are described in the figure below.

THERM File Properties:

- **Cross-section Type:** Head
- **Gravity Arrow:** Down

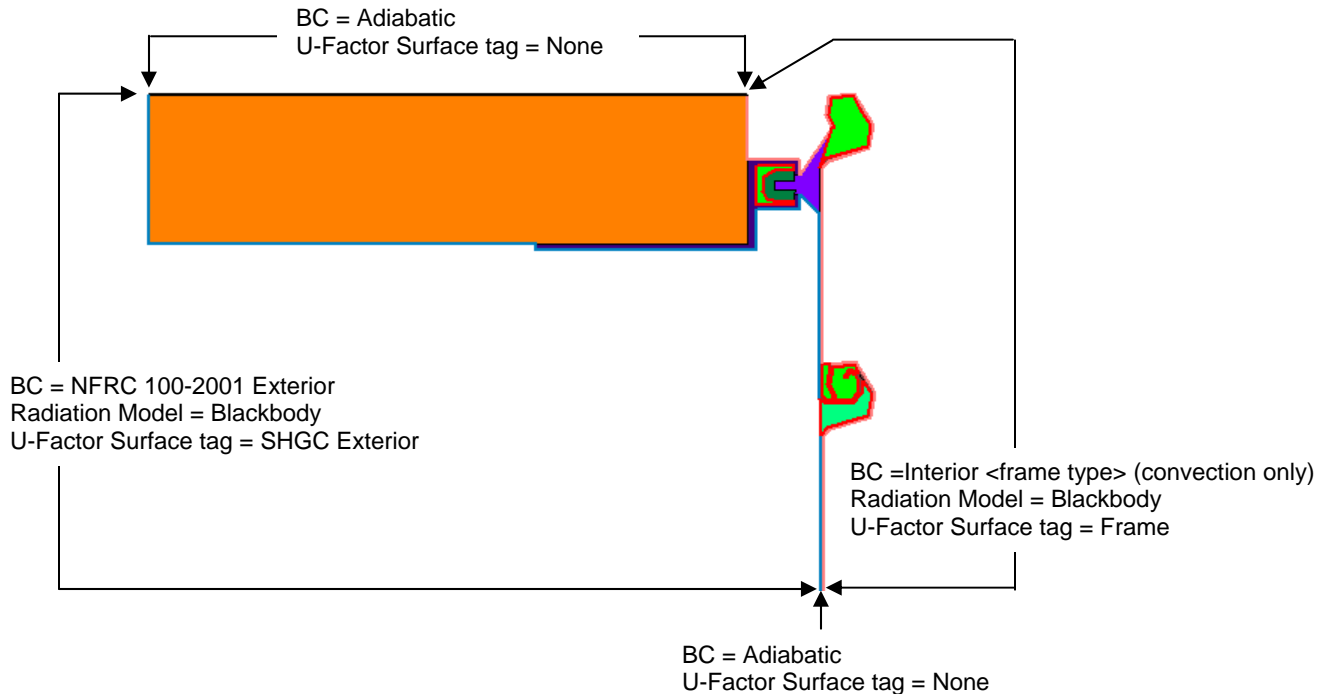


Figure 8-6 Top Rail Model for Rolling Door

8.12.2.2. Bottom Rail Model

A nominal 2 x 6 wood block is used in the bottom rail model of the rolling door. The figure below illustrates the boundary conditions and U-factor tags.

THERM File Properties:

- **Cross-section Type:** Sill
- **Gravity Arrow:** Down

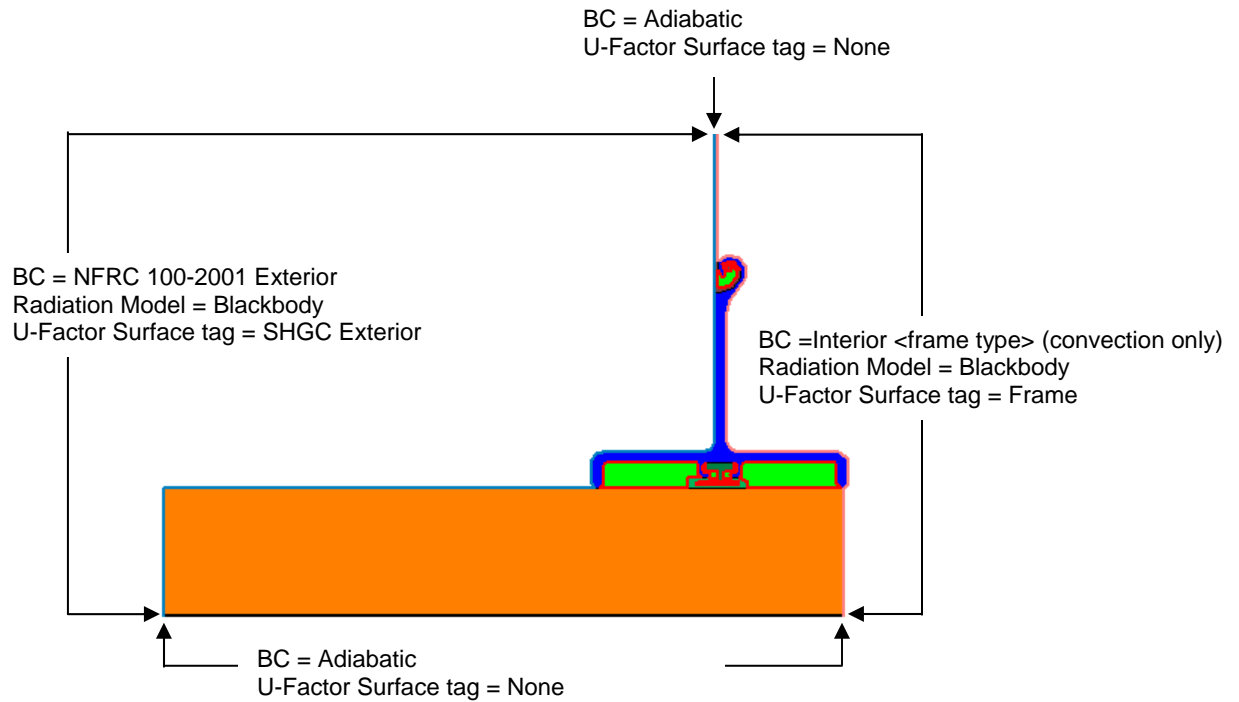


Figure 8-7 Bottom Rail Model for Rolling Door

8.12.2.3. End Stile Model

A nominal 2x6 wood block is used in the Stile Model. The boundary condition type and the U-factor tag used on Stile model are shown in the figure below

THERM File Properties:

- Cross-section Type: Jamb
- Gravity Arrow: Into the Screen

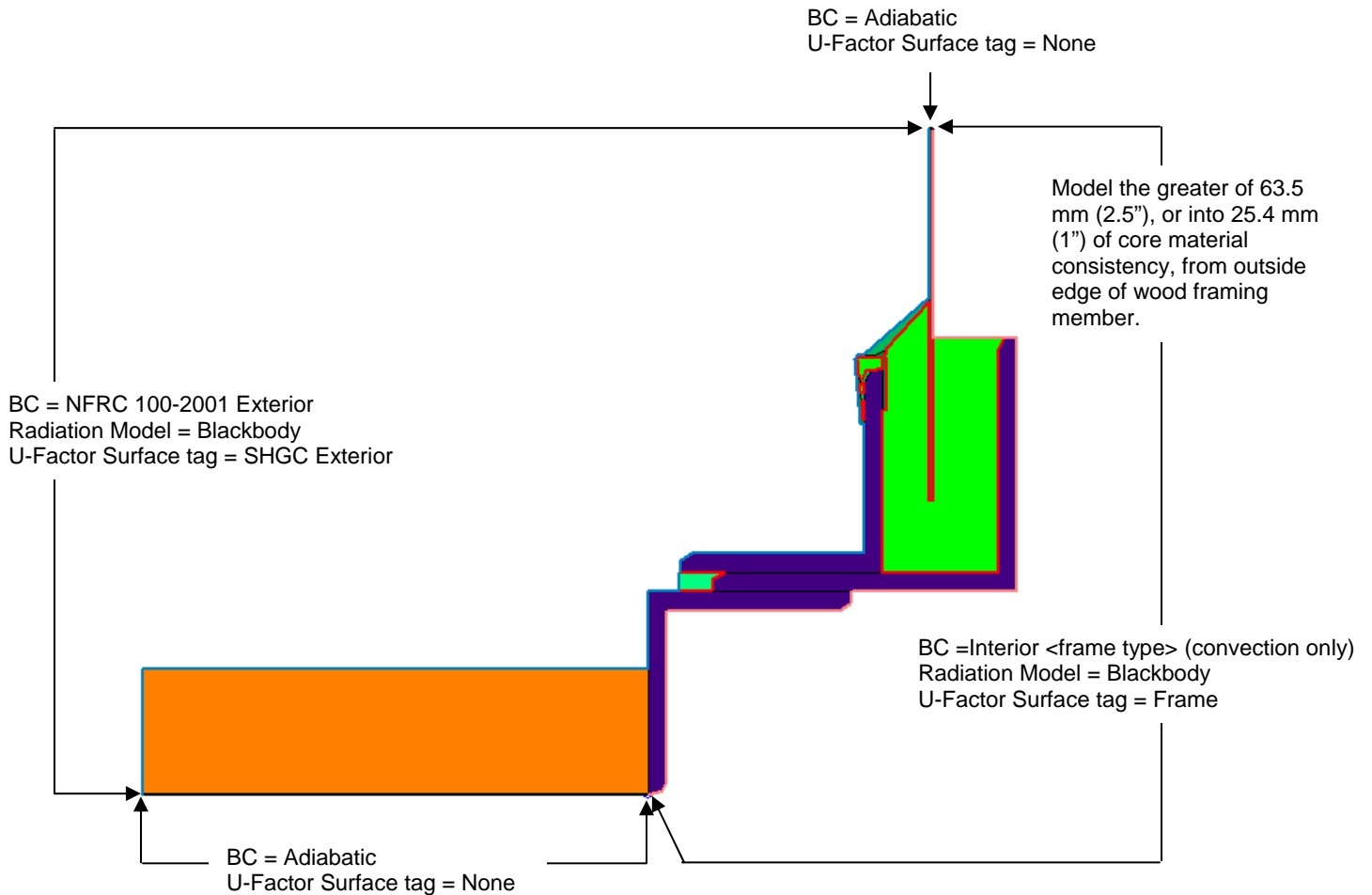


Figure 8-8 End Stile Model for Rolling Door

8.12.2.4. Door Core Model

The Door Core Model shall include two full slats and two half slats at each end. The details of the section where slats join shall be obtained from the manufacturer. The boundary conditions on door core model are specified in the figure below.

THERM File Properties:

- **Cross-section Type:** Horizontal Meeting Rail
- **Gravity Arrow:** Down

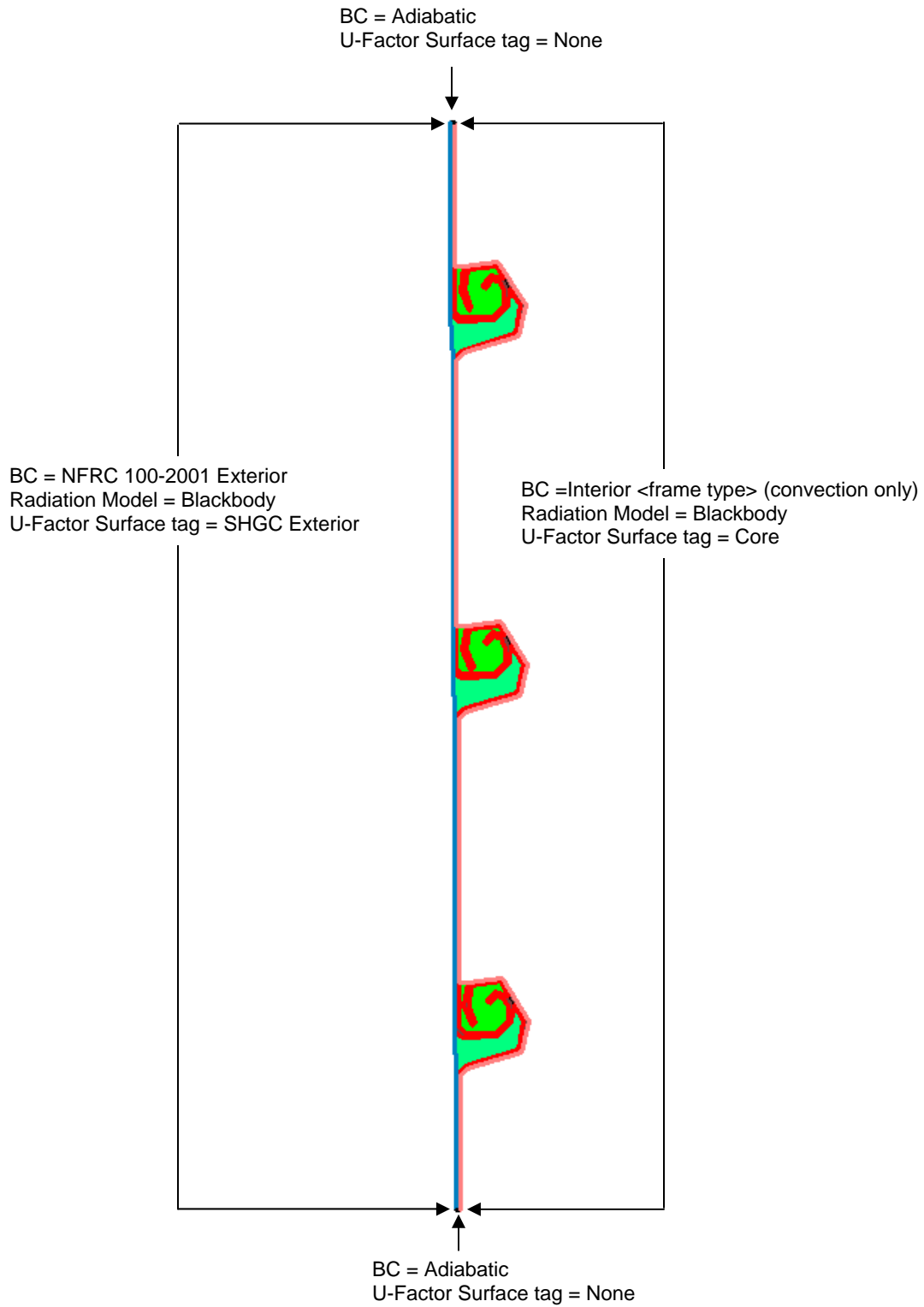


Figure 8-9 Door Core Model for Rolling Door