## General assumptions in INSYDE

*Assumptions on Event features*

If some of the following *Event features* are not directly introduced by the user in INSYDE, default values are assumed in the model. In particular:

- **Water depth in the basement**

Basement is assumed to be completely flooded whenever there is an event: water depth in the basement is considered to be equal to basement height BH;

- **Water depth inside the building (h)**

Internal water depth is calculated from external water depth as h=he-GL, where GL is ground level;

- **Sediment load (s)**

The default value for sediment load is 0.05;

- **Flow velocity**

The default value for velocity is 0.5 m/s;

- **Flood duration**

The default value for flood duration is 24 hours;

- **Water quality:**

The default value for water quality is "1" (i.e. presence of pollutants).

*Assumptions on Building characteristics*

If some of the following *Building characteristics* are not directly introduced by the user in INSYDE, default values are assumed in the model. In particular:

- **Internal perimeter (IP)**

Internal perimeter is considered to be equal to 2.5 times external perimeter (EP);

- **Basement perimeter (BP)**

A default square basement is considered, i.e. basement perimeter is calculated as a function of basement area (BA);

- **Internal area (IA)**

Internal area is considered to be equal to the 90% of floor area (FA);

- **Basement area (BA)**

Basement area is considered to be equal to the 50% of floor area (FA);

- **Heating distribution system**

*Hypotheses for heating distribution system*

If not specifically indicated, heating distribution type PD (centralised or distributed) is assigned based on the year of construction of the building YY. In particular, centralised heating is supposed for dwellings built earlier than 1990; otherwise, distributed heating is considered;

*Hypotheses for heating system type*

If not specifically indicated, heating system type PT (underfloor or radiator heating) is assigned based on finishing level FL and year of construction of the building YY. In particular, an underfloor heating system is supposed for high quality buildings (i.e. FL >1) built later than 2000; otherwise, radiator heating is considered.

*Assumptions on Unit Prices: economies of scale*

When building type is "Apartment house" (BT=3) removal/replacement prices for the different components are reduced by 20% due to economies of scale.

**Hypotheses on damage mechanisms for the different building components**

The general formulation for damage estimation to each building component is the following:

$$C_i = Up_i \cdot Ext(Event; Building)_i \cdot E[R]$$

where: $Up_i$ are the unit prices for the removal/replacement of the building component $i$ (default values are shown in Table A1 of this Annex), *Ext(Event;Building)* is the extension of the building component to be removed/replaced and *E[R]* is the expected damage ratio (see Section 2 of the manuscript).

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Note: For the sake of clarity, in this Annex the following notation is used:

- **Basement level (BL)**: calculated as BL = GL-BH-0.3, where 0.3 m corresponds to the height of the slab;
- **Number of flooded floors ($N_{FF}$)**, which is a function of water depth and interfloor height of the building.

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Cleanup costs

**Pumping (C1)**

The cost for water pumping is calculated by considering water volumes stored in the basement (if present) and in the part of building below ground level (if GL <0).

$$Ext_{C1} = IA \cdot (-GL) + BA \cdot (-BL)$$

$$C_{C1} = Up_{C1} \cdot Ext_{C1}$$

**Waste disposal (C2)**

The cost for waste disposal are supposed to depend on water volumes stored in the first floor and in the basement (if present) and on sediment concentration s. In the case of contaminated water, waste disposal costs are incremented by 40%.

$$Ext_{C2} = (IA \cdot h + BA \cdot BH) \cdot s$$

$$C_{C2} = \begin{cases} Up_{C2} \cdot Ext_{C2}, & q = 0 \\ 1.4 \cdot Up_{C2} \cdot Ext_{C2}, & q = 1 \end{cases}$$

**Cleaning (C3)**

Building surfaces that have been in contact with floodwaters should be cleaned. Then, cleaning costs are calculated by considering water depth, internal perimeter and internal floor area of each flooded storey, including the basement, if present. In the case of contaminated water, waste disposal costs are incremented by 40%.

$$Ext_{C3} = (IP \cdot h + BA + BP \cdot BH + IA \cdot N_{FF})$$

$$C_{C3} = \begin{cases} Up_{C3} \cdot Ext_{C3}, & q = 0 \\ 1.4 \cdot Up_{C3} \cdot Ext_{C3}, & q = 1 \end{cases}$$

**Dehumidification (C4)**

Dehumidification costs appear for long duration floods and they are supposed to depend on building volume (function of the number of flooded floors, including the basement (if present)).

$$Ext_{C4} = (IA \cdot IH \cdot N_{FF} + BA \cdot BH)$$

$$C_{C4} = Up_{C4} \cdot Ext_{C4} \cdot E[R]$$

The expected damage ratio E[R] related to flood duration is given by the distribution shown in Figure 1.

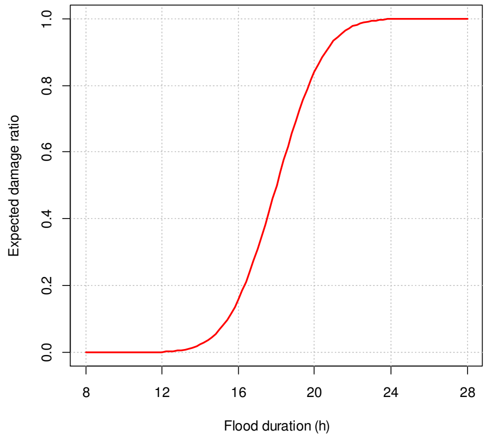


**Figure 1: Distribution of the expected damage ratio as a function of flood duration (all components)**

Removal costs

**Screed removal (R1)**

Screed is considered to be removed in each flooded storey only when the following conditions occur (Penning-Rowsell et al. 2005):

- type of pavement is wood: only high quality buildings (FL>1) are supposed to have wood pavements (otherwise, if not specifically indicated by the user, a ceramic pavement is considered as default condition);

- long duration flood (the expected damage ratio E[R] related to flood duration in the case of wood pavement is given in Figure 1);

- h>0.5 m (probabilistic threshold, h≈0.2 m=lower threshold and h≈0.6 m=upper threshold; see Figure 2).

$$Ext_{R1} = IA \cdot N_{FF}$$

$$C_{R1} = Up_{R1} \cdot Ext_{R1} \cdot E[R]$$

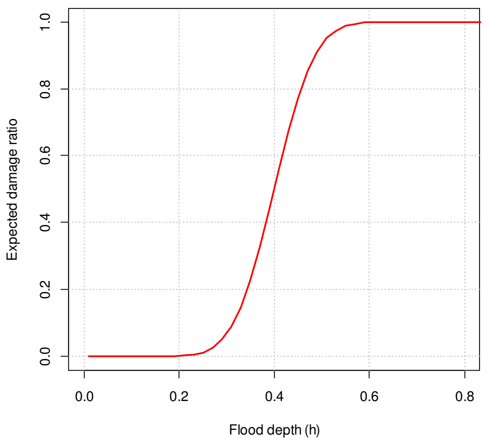


**Figure 2: Distribution of the expected damage ratio as a function of flood depth in each flooded floor (case of wood floors)**

**Pavement removal (R2)**

Pavement removal is considered only when the type of pavement is "wood" (only high quality buildings (FL>1) are supposed to have wood pavements; otherwise, if not specifically indicated by the user, a ceramic pavement is considered as default condition). A full removal of wood pavements in each flooded storey is considered when a long duration flood occurs (Figure 1) and the probabilistic threshold for water depth is given in Figure 2 (h≈0.2 m=lower threshold and h≈0.6 m=upper threshold).

$$Ext_{R2} = IA \cdot N_{FF}$$

$$C_{R2} = Up_{R2} \cdot Ext_{R2} \cdot E[R]$$

**Baseboard removal (R3)**

Baseboard is considered to be removed when a long flood duration occurs and h>0.05 m in each flooded storey (Penning-Rowsell et al. 2005).

$$Ext_{R3} = IP \cdot N_{FF}$$

The expected damage ratio E[R] related to flood duration is given in Figure 1.

$C_{R3} = Up_{R3} \cdot Ext_{R3} \cdot E[R]$

**Removal of partition walls (R4)**

Damage to partition walls is due to absorbed water that can not be dried up. This damage is supposed to appear for long duration floods (Figure 1) and the probabilistic threshold for water depth is given in Figure 3 (h≈1.5 m=lower threshold and h≈2.0 m=upper threshold). If not specifically indicated, the perimeter of partition walls is supposed to be equal to the 50% of the internal perimeter (this value is incremented by 20% for reinforced concrete structures, in order to account for external walls).

$$Ext_{R4} = \begin{cases} 0.5 \cdot IP \cdot IH \cdot N_{FF}, & BS = 2 \\ 1.2 \cdot 0.5 \cdot IP \cdot IH \cdot N_{FF}, & BS = 1 \end{cases}$$

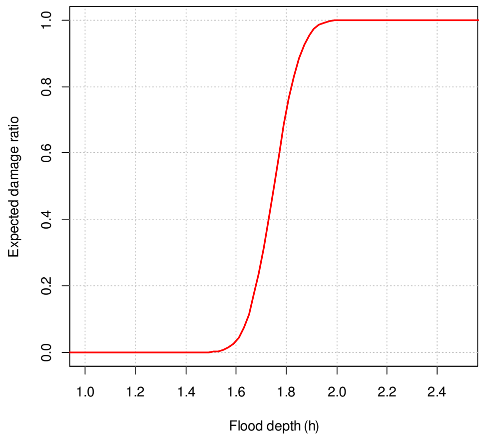


**Figure 3: Distribution of the expected damage ratio as a function of flood depth in each flooded floor (partition walls)**

The expected damage ratio E[R] related to flood duration is given in Figure 1.

$C_{R4} = Up_{R4} \cdot Ext_{R4} \cdot E[R]$

**Plasterboard removal (R5)**

If not specifically indicated, only high quality buildings (FL>1) are supposed to have some areas with plaster ceilings placed 0.5 m below the original ceiling level. Plasterboard area is considered to be equal to the 20% of the internal area of the building. Plasterboard is considered to be removed when flood depth reaches plaster ceiling level.

$Ext_{R5} = 0.2 \cdot IA \cdot N_{FF}$

$C_{R5} = Up_{R5} \cdot Ext_{R5}$

**External plaster removal (R6)**

External plaster is considered to be removed if one (or more) of these conditions occur (Penning-Rowsell et al. 2005):

- long duration flood: longer residence time enhances water penetration into the plaster; the expected damage ratio E[R] is given by the distribution shown in Figure 1;
- high velocity flow: higher flow velocities cause more serious damage to exterior plaster; the expected damage ratio E[R] is given by the distribution shown in Figure 4;
- contaminated water (q=1): plaster replacement is usually required in case of contaminated water; in such scenarios, the expected damage ratio E[R] is 1;

- level of maintenance is “average” or “poor” (i.e. LM≤1), which implies a more vulnerable plaster, even under short duration floods and/or absence of contaminants in the water. For those building maintenance levels, E[R] is considered to be 1.

If more than one of the conditions mentioned above occur, E[R] is considered the maximum among the four. The underlying assumption is that the most unfavourable condition dominates the damage mechanism, independently of the others.

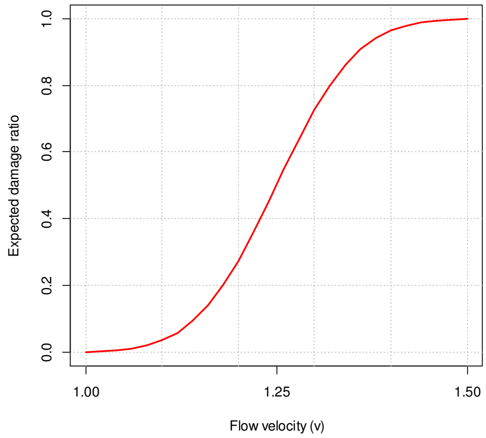


**Figure 4: Distribution of the expected damage ratio as a function of flow velocity (external plaster and doors)**

The height considered in the calculations for plaster removal is equal to the external water depth plus 1.0 m due to capillary rise.

$$Ext_{R6} = EP \cdot (h_e + 1.0)$$

$$C_{R6} = Up_{R6} \cdot Ext_{R6} \cdot (\max(E[R]))$$

**Internal plaster removal (R7)**

Internal plaster is considered to be removed if one (or more) of these conditions occur (Penning-Rowsell et al. 2005):

- long duration flood: longer residence time enhances water penetration into the plaster; the expected damage ratio E[R] is given by the distribution shown in Figure 1;
- contaminated water (q=1): plaster replacement is usually required in case of contaminated water; in such scenarios, the expected damage ratio E[R] is 1;
- level of maintenance is “average” or “poor” (i.e. LM≤1), which implies a more vulnerable plaster, even under short duration floods and/or absence of contaminants in the water. For those building maintenance levels, E[R] is considered to be 1.

If more than one of the conditions mentioned above occur, E[R] is considered the maximum among the three. The underlying assumption is that the most unfavourable condition dominates the damage mechanism, independently of the others.

The height considered in the calculations for plaster removal is equal to the internal water depth plus 1.0 m due to capillary rise.

$$Ext_{R7} = IP \cdot (h + 1.0) + BP \cdot BH$$

$$C_{R7} = Up_{R7} \cdot Ext_{R7} \cdot (\max(E[R]))$$

**Doors removal (R8)**

Doors are supposed to be removed when water depth in each flooded storey is greater than the threshold values given in Figure 5 (h≈0.4 m=lower threshold and h≈0.8 m=upper threshold) and when at least one of these conditions is met (Penning-Rowsell et al. 2005):

- long duration flood: doors may swell under a long contact with water; the expected damage ratio E[R] is given by the distribution shown in Figure 1;
- high velocity flow: doors can be seriously damaged under high velocity flows; the expected damage ratio E[R] is given by the distribution shown in Figure 4;

If more than one of the conditions mentioned above occur, E[R] is considered the maximum among the two. The underlying assumption is that the most unfavourable condition dominates the damage mechanism, independently of the others.

As default, the number of doors in each building is supposed to depend on building use (2 doors per 100 $m^2$ if the use is “basement”, 7 doors per 100 $m^2$ for other storeys). If not specifically indicated, a standard door size is considered (0.8 x 2.1 m).

$$Ext_{R8} = 0.12 \cdot IA \cdot N_{FF} + 0.03 \cdot BA$$

$$C_{R8} = Up_{R8} \cdot Ext_{R8} \cdot (\max(E[R]))$$

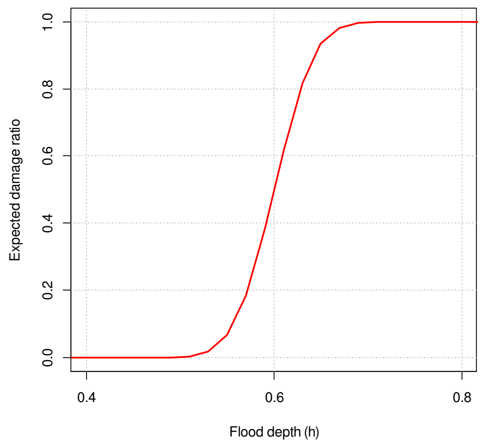


**Figure 5: Distribution of the expected damage ratio as a function of flood depth in each flooded floor (doors)**

**Windows removal (R9)**

Windows are supposed to be removed when water depth in each flooded storey is greater than the threshold values given in Figure 6 (h≈1.2 m=lower threshold and h≈1.8 m=upper threshold) in each flooded storey and at least one of these conditions is met:

- long duration flood: windows may swell under a long contact with water; the expected damage ratio E[R] is given by the distribution shown in Figure 1;
- high velocity flow: windows can be seriously damaged under high velocity flows; the expected damage ratio E[R] is given by the distribution shown in Figure 7;

If more than one of the conditions mentioned above occur, E[R] is considered the maximum among the two. The underlying assumption is that the most unfavourable condition dominates the damage mechanism, independently of the others.

As default, the number of windows in each building is supposed to depend on building use (0 if “basement”, 6 windows per 100 $m^2$ for other storeys). If not specifically indicated, a standard window size is considered (1.4 x 1.4 m).

$Ext_{R9} = 0.12 \cdot IA \cdot N_{FF}$

$C_{R9} = Up_{R9} \cdot Ext_{R9} \cdot (\max(E[R]))$

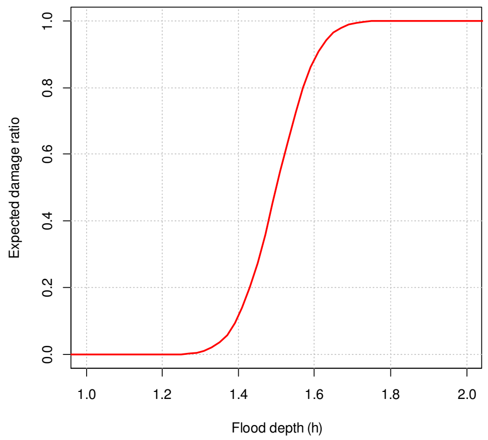


**Figure 6: Distribution of the expected damage ratio as a function of flood depth (windows)**

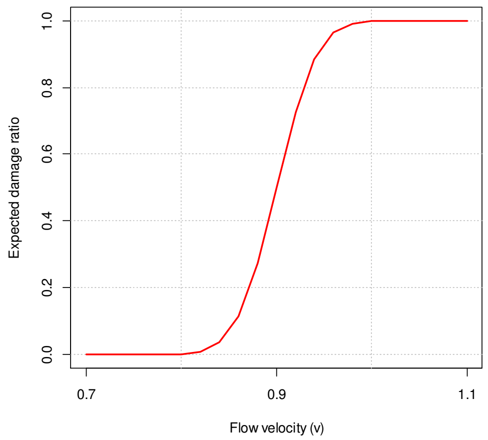


**Figure 7: Distribution of the expected damage ratio as a function of flow velocity (windows)**

**Boiler removal (R10)**

In the case of distributed heating systems (PD=2), boiler is considered to be removed when h>1.6 m in each flooded storey (boiler is supposed to be placed at +1.60 m from pavement level), while for centralised heating systems two conditions are possible:

1) if a basement exists (i.e. BA>0), boiler room is supposed to be located in the basement: boiler is always considered to be removed whenever there is an event (i.e. basement is completely flooded);
2) if basement is not present (i.e. BA=0), boiler room is supposed to be located in the ground/first floor: then boiler is considered to be replaced for h>1.6 m.

$$Ext_{R10} = \begin{cases} IA \cdot N_{FF}\,, & h > 1.6\,m \;\; (when\ PD = 2) \\ IA\,, & h > 0\,m \;\; (when\ PD = 1\ and\ BA > 0) \\ IA\,, & h > 1.6\,m \;\; (when\ PD = 1\ and\ BA = 0) \\ 0, & else \end{cases}$$

$C_{R10} = Up_{R10} \cdot Ext_{R10}$

Non-structural damage

**Partitions replacement (N1)**

The quantity of removed partitions is replaced (see function R4).

$$Ext_{N1} = Ext_{R4}$$

$$C_{N1} = Up_{N1} \cdot Ext_{R4} \cdot E[R]$$

**Screed replacement (N2)**

The quantity of removed screed is replaced (see function R1).

$$Ext_{N2} = Ext_{R1}$$

$$C_{N2} = Up_{N2} \cdot Ext_{N2} \cdot E[R]$$

**Plasterboard replacement (N3)**

The quantity of removed plasterboard is replaced (see function R5).

$$Ext_{N3} = Ext_{R5}$$

$$C_{N3} = Up_{N3} \cdot Ext_{N3}$$

Structural damage

In this version of INSYDE, structural damage is modelled using a simple scheme, based on the approach proposed by Clausen and Clark (1990). Two damage classes (i.e. *Inundation* and *Partial damage*) are distinguished based on specific thresholds for flow velocity and intensity (i.e. the product between external flood depth and velocity) (Figure 8):

- *Inundation* ($v \leq 2$ m/s or $v \cdot he \leq 3$ $m^2/s$): no structural damages occur (i.e. the expected damage ratio E[R] is zero);
- *Partial damage* ($v > 2$ m/s and $3 < v \cdot he \leq 7$ $m^2/s$): some damages to the major structural elements of the building may occur, including soil consolidation, local repair and pillar repair. The expected damage ratio E[R] is given in Figure 8.

At present, INSYDE does not consider the building collapse (which is very unlikely in the case of riverine floods, especially for reinforced concrete and masonry buildings), so the third damage class proposed by Clausen and Clark (1990) (*Total destruction*) is not actually implemented in the model.

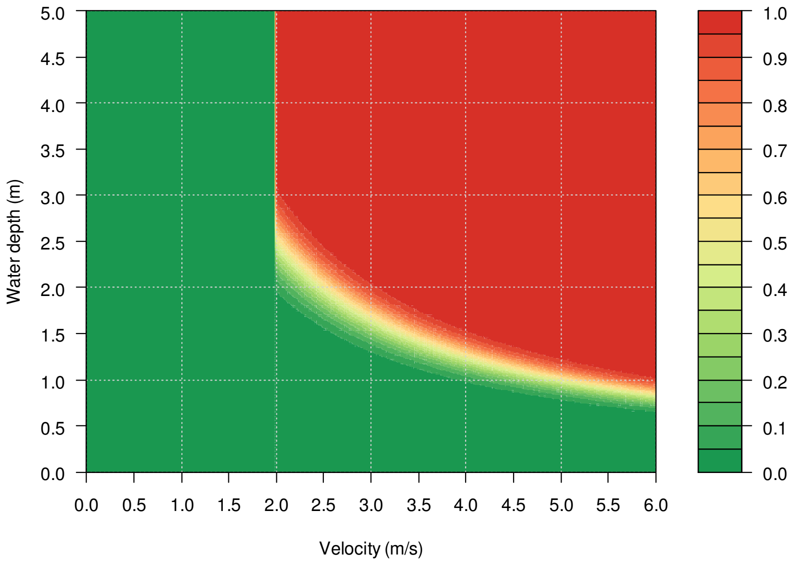


**Figure 8: Distribution of the expected damage ratio as a function of flow velocity and water depth (structural damage)**

**Soil consolidation (S1)**

Flood action may produce some scour near building foundations. The costs for soil consolidation are supposed to depend on building structure and on a fraction of building volume. In particular, if building structure is "Masonry" (BS=2), the volume of soil to be consolidated is supposed to be equal to building volume, multiplied by 0.01; if building structure is "reinforced concrete" (BS=1), the multiplying coefficient is 0.02. These coefficients should be validated, as they should also depend on soil type, building shape and foundation type.

$$Ext_{S1} = \begin{cases} IA \cdot NF \cdot IH \cdot 0.01, & BS = 2 \\ IA \cdot NF \cdot IH \cdot 0.02, & BS = 1 \end{cases}$$

$$C_{S1} = Up_{S1} \cdot Ext_{S1} \cdot E[R]$$

**Local repair (S2)**

Flood action may cause some damage on the external structure of masonry buildings. So, if building structure is "Masonry" (BS=2), local repair costs are considered to be a function of external water depth, sediment load and external perimeter of the building, under the assumption that only two sides of the building may be exposed to flow and that a scour depth of 0.05 m in the masonry should be repaired.

$$Ext_{S2} = 0.5 \cdot EP \cdot h_e \cdot 0.05 \cdot (1 + s)$$

$$C_{S2} = Up_{S2} \cdot Ext_{S2} \cdot E[R]$$

**Pillar repair (S3)**

Flood action may cause some damage on the pillars of reinforced concrete buildings. So, if building structure is "Reinforced concrete" (BS=1), the costs for pillar repair are considered to be a function of external water depth, sediment load and external perimeter of the building (under the assumption that the total perimeter of pillars is equal to the 15% of the external perimeter of the building and that only two sides of the building may be exposed to flow).

$$Ext_{S3} = 0.5 \cdot 0.15 \cdot EP \cdot h_e \cdot (1 + s)$$

$$C_{S3} = Up_{S3} \cdot Ext_{S3} \cdot E[R]$$

Finishing

**External and internal plaster replacement (F1 and F2)**

If removed, external and internal plaster are replaced (see function R6 and R7). These costs are supposed to depend on finishing level FL (i.e. higher quality plaster in high quality buildings).

$$Ext_{F1} = Ext_{R6}$$

$$C_{F1} = Up_{F1} \cdot Ext_{F1} \cdot (\max(E[R])) \cdot FL$$

$$Ext_{F2} = Ext_{R7}$$

$$C_{F2} = Up_{F2} \cdot Ext_{F2} \cdot (\max(E[R])) \cdot FL$$

**External painting (F3)**

The extension of the external area to be repainted is considered to be a function of the height of flooded floors and the external perimeter. The costs for external painting are supposed to depend on finishing level FL (i.e. higher quality painting in high quality buildings).

$$Ext_{F3} = EP \cdot N_{FF} \cdot IH$$

$$C_{F3} = Up_{F3} \cdot Ext_{F3} \cdot FL$$

**Internal painting (F4)**

The costs for internal painting are considered to depend on finishing level and building type. They are calculated by considering the height of flooded floors and the internal perimeter. The contribution of the basement is considered only in the case of high-quality detached houses (i.e. FL>1 and BT=1), while in the other cases the basement is supposed only to be plastered (no need for internal basement repainting).

$$Ext_{F4} = \begin{cases} IP \cdot N_{FF} \cdot IH, & FL \leq 1 \\ IP \cdot N_{FF} \cdot IH + BP \cdot BH, & FL > 1 \ and \ BT = 1 \end{cases}$$

$$C_{F4} = Up_{F4} \cdot Ext_{F4} \cdot FL$$

**Pavement replacement (F5)**

If removed, pavement (see function R2) is replaced.

$$Ext_{F5} = Ext_{R2}$$

$$C_{F5} = Up_{F5} \cdot Ext_{F5} \cdot E[R]$$

**Baseboard replacement (F6)**

The quantity of removed baseboard is replaced (see function R3).

$$Ext_{F6} = Ext_{R3}$$

$$C_{F6} = Up_{F6} \cdot Ext_{F6} \cdot E[R]$$

Windows and doors

**Doors and windows replacement (W1 and W2)**

If removed, doors and windows are replaced. When FL>1, the costs for doors and windows replacement are increased by a factor depending on FL (see functions R8 and R9).

$$Ext_{W1} = Ext_{R8}$$

$$C_{W1} = (1 + 1 \cdot FL) \cdot Up_{W1} \cdot Ext_{W1} \cdot (\max(E[R]))$$

$$Ext_{W2} = Ext_{R9}$$

$$C_{W2} = (1 + 1 \cdot FL) \cdot Up_{W2} \cdot Ext_{W2} \cdot (\max(E[R]))$$

Building systems

**Boiler replacement (P1)**

If removed, boiler is replaced (see function R10).

If building type is “detached” or “semi detached” (BT=1 or BT=2), costs are increased by 25% (as boiler is generally over dimensioned in these cases).

$$Ext_{P1} = Ext_{R10}$$

$$C_{P1} = \begin{cases} 1.25 \cdot Up_{P1} \cdot Ext_{P1}, & BT = 1 \; or \; 2 \\ Up_{P1} \cdot Ext_{P1}, & BT = 3 \end{cases}$$

**Radiator painting (P2)**

If the heating system type is “Radiator” (PT=1), radiator painting is supposed to be required only when h>0.20 m in each flooded storey. One radiator per 20 $m^2$ of building internal floor area is considered.

$$Ext_{P2} = N_{FF} \cdot IA/20$$

$$C_{P2} = Up_{P2} \cdot Ext_{P2}$$

**Replacement of the underfloor heating system (P3)**

The underfloor heating system (i.e. PT=2) is considered to be replaced only when also the screed needs to be removed (see function R1).

$$Ext_{P3} = IA \cdot N_{FF}$$

The expected damage ratio E[R] related to flood duration in the case of wood pavement is given in Figure 1.

$$C_{P3} = Up_{P3} \cdot Ext_{P3} \cdot E[R]$$

**Electrical system replacement (P4)**

Damages to the electrical system are considered exclusively dependant on water depth. Four different classes are distinguished for each flooded storey:

- for h≤0.20 m, the electrical system is not damaged;
- for 0.20<h<1.10 m, lower sockets and cables are damaged, assuming a 40% relative damage;
- for 1.10≤h<1.50 m, upper sockets and cables are also damaged, assuming a 70% relative damage;
- for h≥1.50 m, control panel is also damaged, assuming a 100% relative damage.

$$Ext_{P4} = \begin{cases} 0, & h \leq 0.2 \, m \\ 0.4 \cdot IA \cdot N_{FF}, & 0.2 < h < 1.1 \, m \\ 0.7 \cdot IA \cdot N_{FF}, & 1.1 \leq h < 1.5 \, m \\ IA \cdot N_{FF}, & h \geq 1.5 \, m \end{cases}$$

An incremental coefficient is introduced for FL>1, in order to take into account the presence of more sophisticated systems (e.g. presence of security alarm systems, home automation systems, etc.) in high quality buildings.

$$C_{P4} = (1 + 1 \cdot FL) \cdot Up_{P4} \cdot Ext_{P4}$$

**Plumbing system replacement (P5)**

Damages to the plumbing system are supposed to occur if the sediment load is relevant (i.e. $s>0.10$) or if water is contaminated ($q=1$). Under these conditions, plumbing system is supposed be obstructed and/or damaged.

For what concerns the influence of water depth, four different classes are distinguished:

- for $h \leq 0.15$ m, the plumbing system is not damaged;
- for $0.15<h<0.40$ m, the shower can be damaged, assuming a 10% relative damage;
- for $0.40 \leq h<0.90$ m, toilet bowl and bidet can also be damaged, assuming a 30% relative damage;
- for $h \geq 0.90$ m, sinks can be damaged, assuming a 50% relative damage.

$$Ext_{P5} = \begin{cases} 0\,, & h \leq 0.15\ m \\ 0.1 \cdot IA \cdot N_{FF}\,, & 0.15 < h < 0.4\ m \\ 0.3 \cdot IA \cdot N_{FF}\,, & 0.4 \leq h < 0.9\ m \\ 0.5 \cdot IA \cdot N_{FF}, & h \geq 0.9\ m \end{cases}$$

An incremental coefficient is introduced for $FL>1$, in order to take into account the presence of more sophisticated systems in high quality buildings.

$$C_{P5} = Up_{P5} \cdot Ext_{P5} \cdot FL$$

**References**


Clausen, L. and Clark, P.B.: The development of criteria for predicting dam break flood damages using modelling of historical dam failures, in: International Conference on River Flood Hydraulics, edited by: White, W. R., Hydraulics Research Limited, John Wiley & Sons Ltd., Wallingford, UK, 369–380, 1990.

Penning-Rowsell, E., Johnson, C., Tunstall, S., Tapsell, S., Morris, J., Chatterton, J., and Green, C.: The benefits of flood and coastal risk management: a handbook of assessment techniques. Middlesex University Press, UK, 2005.

| Components | Subcomponents | Unit of measurement | Default value |
|---|---|---|---|
| Clean-up | C1- Pumping of water | €/m$^3$ of water | 2.50 |
| | C2 -Waste disposal | €/m$^3$ of waste | 35.00 |
| | C3 - Cleaning | €/m$^2$ of surface to be cleaned | 2.40 |
| | C4- Dehumidification | €/m$^3$ of building volume | 5.00 |
| Removal | R1- Screed removal | €/m$^2$ of building area | 11.80 |
| | R2 - Pavement (wood) | €/m$^2$ of building area | 6.20 |
| | R3 - Baseboard | €/m of baseboard | 0.63 |
| | R4 - Partitions | €/m$^2$ of wall | 14.90 |
| | R5- Plasterboard | €/m$^2$ of plasterboard | 11.80 |
| | R6 - External plaster | €/m$^2$ of wall | 7.10 |
| | R7 - Internal plaster | €/m$^2$ of wall | 7.10 |
| | R8 - Doors | €/m$^2$ of door surface | 21.10 |
| | R9 - Windows | €/m$^2$ of window surface | 21.10 |
| | R10 - Boiler | €/m$^2$ of building area | 0.25 |
| Non-structural | N1 - Partitions replacement | €/m$^2$ of wall | 67.20 |
| | N2 - Screed replacement | €/m$^2$ of building area | 18.70 |
| | N3 - Plasterboard replacement | €/m$^2$ of plasterboard | 45.50 |
| Structural components | S1 - Soil consolidation | €/m$^3$ of soil | 290.00 |
| | S2 - Local repair | €/m$^2$ of masonry | 37.50 |
| | S3 - Pillar repair | €/m$^2$ of pillar surface | 320.00 |
| Finishing | F1 - External plaster replacement | €/m$^2$ of wall | 27.50 |
| | F2 - Internal plaster replacement | €/m$^2$ of wall | 25.30 |
| | F3 - External painting | €/m$^2$ of wall | 10.30 |
| | F4 - Internal painting | €/m$^2$ of wall | 8.10 |
| | F5 - Pavement replacement (wood) | €/m$^2$ of building area | 113.00 |
| | F6 - Baseboard replacement | €/m of baseboard | 2.40 |
| Windows & doors | W1 - Doors replacement | €/m$^2$ of door surface | 195.00 |
| | W2 - Windows replacement | €/m$^2$ of window surface | 268.50 |
| Plants | P1 - Boiler replacement | €/m$^2$ of building area | 17.80 |
| | P2 - Radiator painting | €/item | 62.00 |
| | P3 - Underfl. heat. sys. replacement | €/m$^2$ of building area | 72.00 |
| | P4 - Electrical system replacement | €/m$^2$ of building area | 42.90 |
| | P5 - Plumbing system replacement | €/m$^2$ of building area | 28.90 |

**Table A1. Unit of measurement and default unitary prices for damage estimation at the different building subcomponents.**