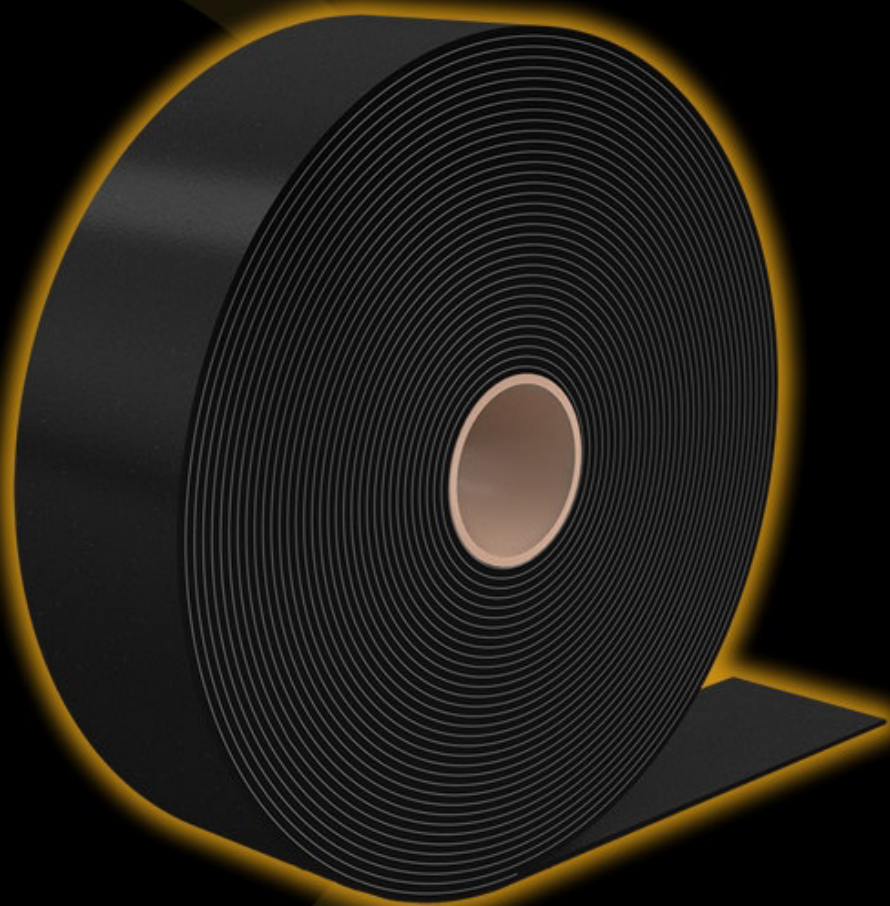


# INTU FR WRAP L

*Intumescent pipe roll*

TDS Technical Data Sheet



**•INTUSEAL®**  
*passive fire protection manufacturer*



[www.intuseal.com](http://www.intuseal.com)

## → PRODUCT DESCRIPTION

The intumescent pipe wrap roll **INTU FR WRAP L** is made of graphite-based material that swells during a fire, preventing the spread of fire, creating a barrier ensuring that the partition remains tight and insulation up to EI 240.

## → APPLICATION

The **INTU FR WRAP L** tape is used for fire-retardant protection of plastic, composite and multi-layer composite pipes passing through fire separation partitions, individually or in bundles, as well as flammable and non-flammable pipes in insulation.

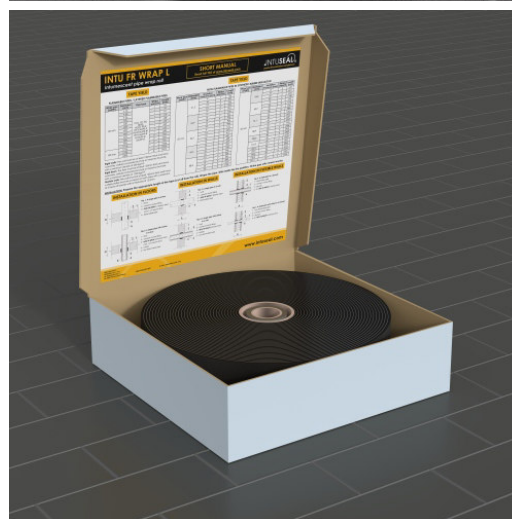
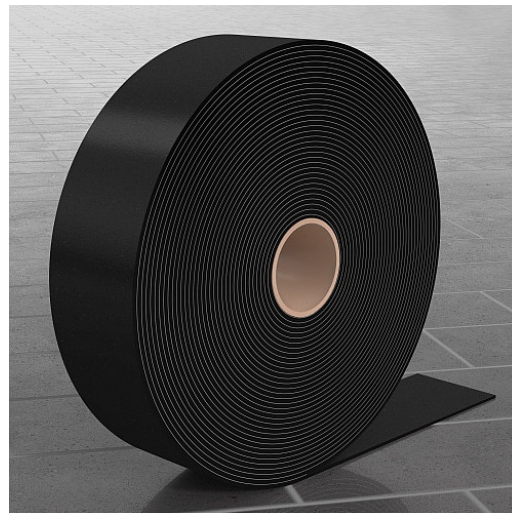
|                        |                                                                                                                                                            |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Flexible walls:</b> | The wall must be 100 mm minimum thickness. Must have steel profile structure covered on both sides with minimum 2 layers of boards with thickness 12,5 mm. |
| <b>Rigid walls:</b>    | The wall must be 150 mm minimum thickness. Must have concrete, cellular concrete or masonry structure, with minimum density 450 kg/m <sup>3</sup> .        |
| <b>Rigid floors:</b>   | The floor must be 150 mm minimum thickness. Must have concrete, cellular concrete or masonry structure, with minimum density 550 kg/m <sup>3</sup> .       |

## → AVAILABILITY

| Dimensions    | Type                  | Box | Pallet | Article number |
|---------------|-----------------------|-----|--------|----------------|
| 60 mm x 10 m  | without adhesive tape | 1   | 375    | INWRL60X10     |
| 100 mm x 10 m | without adhesive tape | 1   | 225    | INWRL100X10    |
| 60 mm x 10 m  | with adhesive tape    | 1   | 375    | INWRL60X10AT   |
| 100 mm x 10 m | with adhesive tape    | 1   | 225    | INWRL100X10AT  |
| 60 mm x 25 m  | without adhesive tape | 1   | 72     | INWRL60X25     |
| 100 mm x 25 m | without adhesive tape | 1   | 72     | INWRL100X25    |
| 60 mm x 25 m  | with adhesive tape    | 1   | 72     | INWRL60X25AT   |
| 100 mm x 25 m | with adhesive tape    | 1   | 72     | INWRL100X25AT  |

## → TRANSPORT AND STORAGE

It is recommended to transport and storage at dry internal conditions at temp. between + 5°C and + 35°C.



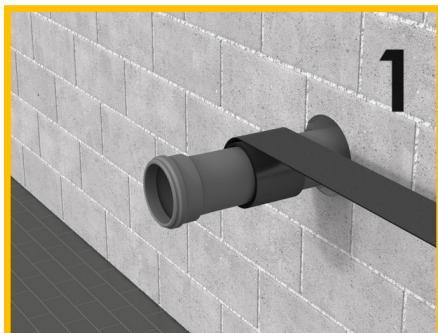
## → COMPLIANCE

- Test standard:  
**EN 1366-3 / EAD 350454-00-1104**
- European Technical Assessment:  
**ETA 18/0593 of 31/12/2018**
- Declaration of Performance:  
**DoP 11/2019**
- Certificate of Constancy of Performance  
**1488-CPR-0722/W**

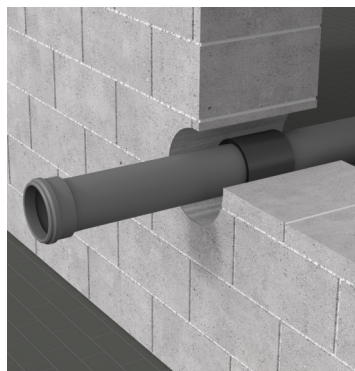
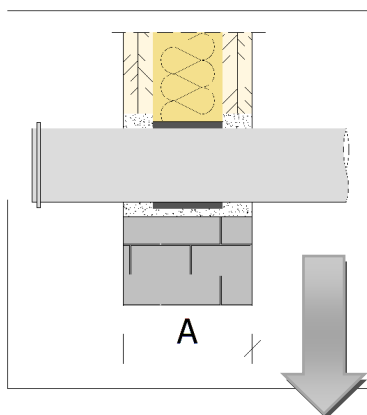


## ➔ INSTALLATION METHOD

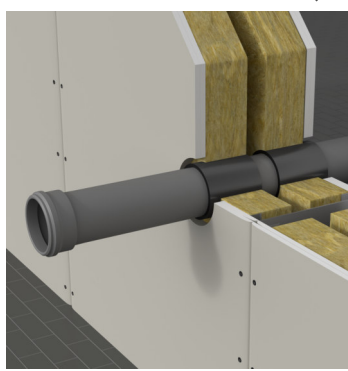
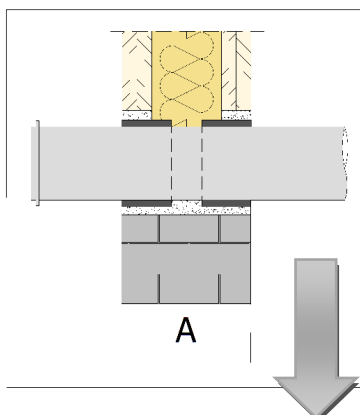
- 1) Prepare the appropriate length of the tape (cut off from the roll).  
Wrap the pipe from one side or from two sides of the partition.
- 2) Slide **INTU FR WRAP L** inside the partition.
- 3) Fill the gap with mortar or fire protection sealant (e.g. **INTU FR MASTIC**).



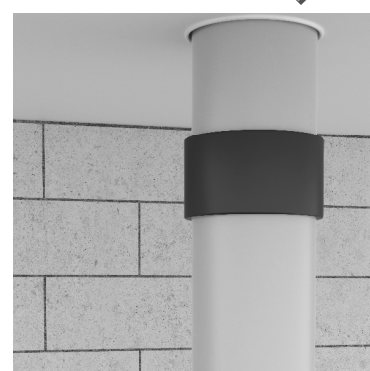
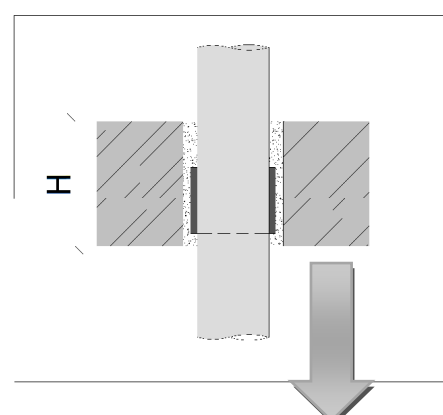
Flexible/rigid wall  $A \geq 100$  mm  
or for rigid wall  $A \geq 150$  mm  
Single row of tape, installed in wall axis



Flexible/rigid wall  $A \geq 125$  mm  
Double rows of tape  
Flushed with the edge of the partition



Rigid floor  $H \geq 150$  mm  
Single row of tape, installed max. 10 mm  
from the floor bottom



#### ➔ TECHNICAL DATA

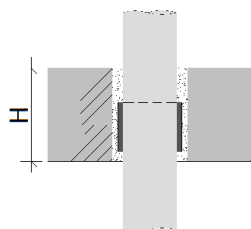
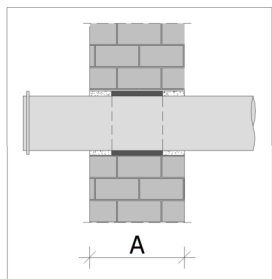
|  |                               |                    |                                 |  |                           |                               |                    |                                 |
|-----------------------------------------------------------------------------------|-------------------------------|--------------------|---------------------------------|------------------------------------------------------------------------------------|---------------------------|-------------------------------|--------------------|---------------------------------|
| Pipe diameter<br>Ø [mm]                                                           | INTU FR WRAP L<br>Length [cm] | Quantity of layers | Quantity wrapped pipes/10m roll | Pipe Ø [mm]                                                                        | Insulation thickness [mm] | INTU FR WRAP L<br>Length [cm] | Quantity of layers | Quantity wrapped pipes/10m roll |
| 32                                                                                | 10                            | 1                  | 100                             | 21,3                                                                               | 9                         | 13                            | 1                  | 80                              |
| 40                                                                                | 13                            | 1                  | 79                              |                                                                                    | 13                        | 31                            | 2                  | 32                              |
| 50                                                                                | 16                            | 1                  | 63                              | 42,4                                                                               | 9                         | 19                            | 1                  | 52                              |
| 55                                                                                | 18                            | 1                  | 57                              |                                                                                    | 13                        | 45                            | 2                  | 22                              |
| 63                                                                                | 20                            | 1                  | 50                              | 88,9                                                                               | 13                        | 74                            | 2                  | 13                              |
| 75                                                                                | 24                            | 1                  | 42                              |                                                                                    | 25                        | 135                           | 3                  | 7                               |
| 90                                                                                | 58                            | 2                  | 17                              | 114,3                                                                              | 25                        | 159                           | 3                  | 6                               |
| 110                                                                               | 71                            | 2                  | 14                              |                                                                                    | 50                        | 277                           | 4                  | 3                               |
| 125                                                                               | 165                           | 4                  | 6                               | 168,3                                                                              | 25                        | 210                           | 3                  | 4                               |
| 160                                                                               | 264                           | 5                  | 3                               |                                                                                    | 50                        | 345                           | 4                  | 2                               |
| 200                                                                               | 538                           | 8                  | 1                               | 219,1                                                                              | 50                        | 409                           | 4                  | 2                               |

#### Calculation of INTU FR WRAP L consumption

- Pipe without insulation:  $L_{TAPE} = \pi \cdot \varnothing_{PIPE}$   
example for pipe Ø50:  $L_{TAPE} = \pi \cdot 50 = \sim 160 \text{ mm}$
- Pipe with insulation:  $L_{TAPE} = \pi \cdot (\varnothing_{PIPE} + 2 \cdot \text{insulation thickness})$   
example for pipe Ø21,3  
with 9 mm insulation:  $L_{TAPE} = \pi \cdot (21,3 + 2 \cdot 9) = \sim 130 \text{ mm}$

|                                 |                                                                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Colour                          | Graphite                                                                                                                                                         |
| Shelf life                      | Not applicable                                                                                                                                                   |
| Usage category                  | Type Z <sub>2</sub> : intended for use in internal conditions with humidity lower than 85% RH, excluding temperatures below 0°C, without exposure to rain or UV. |
| Reaction to fire                | E                                                                                                                                                                |
| Methods used for the assessment | EAD 350454-00-1104 "Fire Stopping and Fire Sealing Products. Penetration Seals"                                                                                  |
| Approvals                       | ETA-18/0593 of 31/12/2018 and Classification report No.: 01988.2/23/Z00NZP                                                                                       |
| Joint finish                    | Cement mortar or acrylic mastic INTU FR MASTIC                                                                                                                   |
| Large gaps                      | System compatible with INTU FR BOARD A based on the classification report number 01988.2/23/Z00NZP                                                               |

## ➔ FIRE RESISTANCE CLASSIFICATION



Combustible pipe penetration seals with one row of tape INTU FR WRAP L  
rigid wall with thick A ≥ 150 mm  
rigid floor with thick H ≥ 150 mm

Fig.1-2  
page15

| Pipe material | Pipe diameter Ø [mm] | RIGID WALL               |                                                        |                           | RIGID FLOOR              |                                                        |                           |
|---------------|----------------------|--------------------------|--------------------------------------------------------|---------------------------|--------------------------|--------------------------------------------------------|---------------------------|
|               |                      | Pipe wall thickness [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C | Pipe wall thickness [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| PVC           | Ø ≤ 50               | 1,8 – 3,6                | 1 x 1 x 60                                             | EI 240                    | 1,8 – 4,2                | 1 x 1 x 60                                             | EI 240                    |
|               |                      | 3,7 – 4,2                |                                                        | EI 180                    |                          |                                                        |                           |
|               | 50 < Ø ≤ 75          | 1,9 – 3,5                | 1 x 1 x 60                                             | EI 180                    | 1,9 – 4,2                | 1 x 1 x 60                                             | EI 240                    |
|               |                      | 3,6                      |                                                        | EI 240                    |                          |                                                        |                           |
|               |                      | 3,7 – 4,2                |                                                        | EI 180                    |                          |                                                        |                           |
|               | 75 < Ø ≤ 90          | 2,1 – 3,5                | 1 x 2 x 60                                             | EI 120                    | 2,1 – 3,4                | 1 x 2 x 60                                             | EI 240                    |
|               |                      | 3,6                      |                                                        | EI 240                    | 3,5 – 4,2                |                                                        | EI 180                    |
|               |                      | 3,7 – 4,2                |                                                        | EI 180                    |                          |                                                        |                           |
|               | 90 < Ø ≤ 110         | 2,2 – 3,5                | 1 x 2 x 60                                             | EI 120                    | 2,2                      | 1 x 2 x 60                                             | EI 240                    |
|               |                      | 3,6                      |                                                        | EI 240                    | 2,3 – 4,2                |                                                        | EI 180                    |
|               |                      | 3,7 – 4,2                |                                                        | EI 180                    |                          |                                                        |                           |
|               | 110 < Ø ≤ 125        | 3,4 – 6,1                | 1 x 4 x 100                                            | EI 120                    | 2,5 – 3,9                | 1 x 4 x 100                                            | EI 120                    |
|               |                      | 6,2                      | 1 x 5 x 100                                            | EI 240                    | 4,0 – 5,3                |                                                        | EI 240                    |
|               |                      | 6,3 – 9,5                |                                                        | EI 180                    | 5,4 – 7,7                | 1 x 5 x 100                                            |                           |
|               | 125 < Ø ≤ 160        | 6,2                      | 1 x 5 x 100                                            | EI 240                    | 3,2 – 7,6                | 1 x 5 x 100                                            | EI 120                    |
|               |                      | 6,3 – 9,5                |                                                        | EI 180                    | 7,7                      |                                                        | EI 240                    |
|               | 160 < Ø ≤ 170        | 5,9                      | 1 x 8 x 100                                            | EI 180                    | 4,4 – 7,6                | 1 x 6 x 100                                            | EI 120                    |
|               |                      | 6,0 – 6,1                | 1 x 7 x 100                                            |                           | 7,7                      |                                                        | EI 240                    |
|               |                      | 6,2 – 9,1                | 1 x 6 x 100                                            | EI 120                    |                          |                                                        |                           |
|               | 170 < Ø ≤ 185        | 5,9                      | 1 x 8 x 100                                            | EI 180                    | 6,1 – 7,6                | 1 x 7 x 100                                            | EI 120                    |
|               |                      | 6,0                      | 1 x 7 x 100                                            |                           | 7,7                      |                                                        | EI 240                    |
|               |                      | 6,1 – 8,4                | 1 x 6 x 100                                            | EI 120                    |                          |                                                        |                           |
|               | 185 < Ø ≤ 200        | 5,9                      | 1 x 8 x 100                                            | EI 180                    | 7,7                      | 1 x 8 x 100                                            | EI 240                    |
|               |                      | 6,0 – 7,7                |                                                        | EI 120                    |                          |                                                        |                           |

| Pipe material                             | Pipe diameter<br>Ø<br>[mm] | RIGID WALL                  |                                                                 |                              | RIGID FLOOR                 |                                                                 |                              |        |
|-------------------------------------------|----------------------------|-----------------------------|-----------------------------------------------------------------|------------------------------|-----------------------------|-----------------------------------------------------------------|------------------------------|--------|
|                                           |                            | Pipe wall thickness<br>[mm] | Tape rows<br>x number of tape<br>wraps x tape<br>thickness [mm] | Configuration<br>C/C and U/C | Pipe wall thickness<br>[mm] | Tape rows<br>x number of tape<br>wraps x tape<br>thickness [mm] | Configuration<br>C/C and U/C |        |
| PE-HD<br><br>PE<br><br>ABS<br><br>SAN+PVC | Ø ≤ 32                     | 2,0 – 6,8                   | 1 x 1 x 60                                                      | EI 240                       | 2,0 – 6,8                   | 1 x 1 x 60                                                      | EI 240                       |        |
|                                           |                            | 6,9 – 10,0                  |                                                                 | EI 120                       | 6,9 – 10,0                  | 1 x 2 x 60                                                      | EI 120                       |        |
|                                           | 32 < Ø ≤ 40                | 2,3 – 6,7                   | 1 x 1 x 60                                                      | EI 240                       | 2,2 – 6,8                   | 1 x 1 x 60                                                      | EI 240                       |        |
|                                           |                            | 6,8                         |                                                                 |                              | 6,9 – 10,0                  | 1 x 2 x 60                                                      | EI 120                       |        |
|                                           |                            | 40 < Ø ≤ 50                 |                                                                 | 2,6 – 6,7                    | 1 x 1 x 60                  | EI 120                                                          |                              |        |
|                                           | 6,8                        |                             | EI 240                                                          | 2,5 – 6,8                    |                             | 1 x 1 x 60                                                      | EI 240                       |        |
|                                           | 6,9 – 10,0                 |                             | EI 240                                                          | 6,9 – 10,0                   |                             | 1 x 2 x 60                                                      | EI 120                       |        |
|                                           | 50 < Ø ≤ 55                | 2,7 – 6,7                   | 1 x 1 x 60                                                      | EI 120                       |                             |                                                                 |                              |        |
|                                           |                            | 6,8                         |                                                                 | EI 240                       | 2,6 – 6,8                   | 1 x 1 x 60                                                      | EI 240                       |        |
|                                           |                            | 6,9 – 10,0                  |                                                                 | EI 240                       | 6,9 – 10,0                  | 1 x 2 x 60                                                      | EI 120                       |        |
|                                           | 55 < Ø ≤ 63                | 2,9 – 6,7                   | 1 x 1 x 60                                                      | EI 120                       |                             |                                                                 |                              |        |
|                                           |                            | 6,8                         |                                                                 | EI 240                       | 2,8 – 6,8                   | 1 x 1 x 60                                                      | EI 240                       |        |
|                                           |                            | 6,9 – 10,0                  |                                                                 | EI 240                       | 6,9 – 10,0                  | 1 x 2 x 60                                                      | EI 120                       |        |
|                                           | 63 < Ø ≤ 75                | 3,3 – 6,7                   | 1 x 1 x 60                                                      | EI 120                       |                             |                                                                 |                              |        |
|                                           |                            | 6,8                         |                                                                 | EI 240                       | 3,0 – 6,8                   | 1 x 1 x 60                                                      | EI 240                       |        |
|                                           |                            | 6,9 – 10,0                  |                                                                 | EI 240                       | 6,9 – 10,0                  | 1 x 2 x 60                                                      | EI 120                       |        |
|                                           | PE<br>75 < Ø ≤ 90          | 3,7 – 10,0                  | 1 x 2 x 60                                                      | EI 120                       |                             |                                                                 |                              |        |
|                                           |                            |                             |                                                                 |                              | 3,6 – 5,7                   | 1 x 2 x 60                                                      | EI 240                       |        |
|                                           |                            |                             |                                                                 |                              | 5,8 – 10,0                  |                                                                 | EI 120                       |        |
|                                           | ABS<br>90 < Ø ≤ 110        | 4,2 – 10,0                  | 1 x 2 x 60                                                      |                              | 5,7                         | 1 x 2 x 60                                                      | EI 240                       |        |
|                                           |                            |                             |                                                                 |                              | 5,8 – 10,0                  |                                                                 | EI 120                       |        |
|                                           | SAN+PVC<br>110 < Ø ≤ 125   |                             |                                                                 |                              |                             | 4,8 – 5,8                                                       | 1 x 4 x 100                  | EI 240 |
|                                           |                            | 4,8 – 9,4                   | 1 x 4 x 100                                                     | EI 120                       | 5,9 – 6,2                   | EI 120                                                          |                              |        |
|                                           |                            |                             |                                                                 |                              | 1 x 5 x 100                 | EI 240                                                          |                              |        |
|                                           |                            | 9,5                         | 1 x 5 x 100                                                     | EI 180                       | 6,3 – 9,5                   | 1 x 4 x 100                                                     | EI 120                       |        |
|                                           |                            |                             |                                                                 |                              | 1 x 5 x 100                 | EI 240                                                          |                              |        |
|                                           |                            |                             |                                                                 |                              | 9,6 – 9,9                   | 1 x 4 x 100                                                     | EI 120                       |        |
|                                           | 125 < Ø ≤ 160              | 6,2 – 9,4                   | 1 x 5 x 100                                                     | EI 120                       | 6,2 – 9,5                   | 1 x 5 x 100                                                     | EI 240                       |        |
|                                           |                            | 9,5                         |                                                                 | EI 180                       |                             |                                                                 |                              |        |
|                                           | 160 < Ø ≤ 170              | 6,6 – 9,1                   | 1 x 6 x 100                                                     | EI 90                        |                             |                                                                 |                              |        |
|                                           |                            | 9,2 – 10,1                  |                                                                 | EI 60                        | 6,6 – 10,1                  | 1 x 6 x 100                                                     | EI 90                        |        |
|                                           |                            | 10,2 -11,0                  | 10,2 – 11,0                                                     |                              | 1 x 7 x 100                 |                                                                 |                              |        |
|                                           |                            | 11,1 – 11,9                 | 1 x 8 x 100                                                     |                              | 11,1 – 11,9                 | 1 x 8 x 100                                                     |                              |        |
|                                           | 170 < Ø ≤ 185              | 7,2 – 8,4                   | 1 x 7 x 100                                                     | EI 90                        |                             |                                                                 |                              |        |
|                                           |                            | 8,5 – 11,0                  |                                                                 | EI 60                        | 7,2 – 11,0                  | 1 x 7 x 100                                                     | EI 90                        |        |
|                                           |                            | 11,1 – 11,9                 | 1 x 8 x 100                                                     |                              | 11,1 – 11,9                 | 1 x 8 x 100                                                     |                              |        |
|                                           | 185 < Ø ≤ 200              | 7,7                         | 1 x 8 x 100                                                     | EI 90                        |                             |                                                                 |                              |        |
| 7,8 – 11,9                                |                            | EI 60                       |                                                                 | 7,7 – 11,9                   | 1 x 8 x 100                 | EI 90                                                           |                              |        |

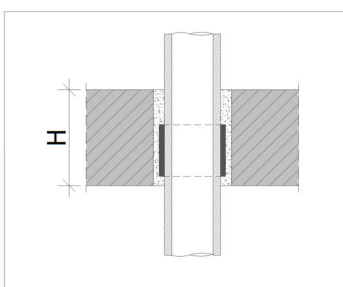
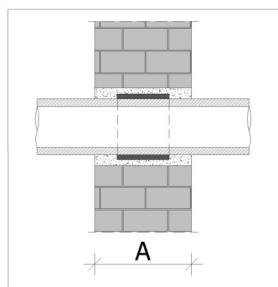
| Pipe material     | Pipe diameter<br>Ø<br>[mm] | RIGID WALL               |                                                                 |                              | RIGID FLOOR                 |                                                                 |                              |             |
|-------------------|----------------------------|--------------------------|-----------------------------------------------------------------|------------------------------|-----------------------------|-----------------------------------------------------------------|------------------------------|-------------|
|                   |                            | Pipe wall thickness [mm] | Tape rows<br>x number of tape<br>wraps x tape<br>thickness [mm] | Configuration<br>C/C and U/C | Pipe wall thickness<br>[mm] | Tape rows<br>x number of tape<br>wraps x tape<br>thickness [mm] | Configuration<br>C/C and U/C |             |
| PP                | Ø ≤ 50                     | 1,8                      | 1 x 1 x 60                                                      | EI 240                       | 1,8 – 12,5                  | 1 x 1 x 60                                                      | EI 240                       |             |
|                   |                            | 1,9 – 18,4               |                                                                 | EI 180                       | 12,6 – 18,4                 | 1 x 2 x 60                                                      |                              |             |
|                   | 50 < Ø ≤ 75                | 1,9 – 18,4               |                                                                 |                              | 1,9 – 12,5                  | 1 x 1 x 60                                                      |                              |             |
|                   |                            | 75 < Ø ≤ 90              |                                                                 |                              | 2,3 – 18,4                  | 12,6 – 18,4                                                     |                              | 1 x 2 x 60  |
|                   | 90 < Ø ≤ 110               | 2,7 – 18,4               |                                                                 |                              | 2,3 – 18,4                  |                                                                 |                              |             |
|                   | 110 < Ø ≤ 125              | 3,8 – 16,7               |                                                                 |                              | 1 x 4 x 100                 | EI 60                                                           |                              |             |
|                   |                            |                          | 3,6 – 3,7                                                       | 1 x 5 x 100                  |                             |                                                                 | EI 90                        |             |
|                   |                            |                          | 3,8 – 14,8                                                      |                              |                             |                                                                 | EI 45                        |             |
|                   | 125 < Ø ≤ 160              | 5,5 – 12,5               | 1 x 5 x 100                                                     |                              | 14,9 – 16,7                 |                                                                 | 1 x 5 x 100                  | EI 45       |
|                   |                            |                          |                                                                 | 5,5 – 6,1                    | EI 90                       |                                                                 |                              |             |
|                   | 160 < Ø ≤ 170              | 6,1 – 11,3               | 1 x 6 x 100                                                     | 6,2                          | 1 x 6 x 100                 |                                                                 | EI 45                        |             |
|                   | 170 < Ø ≤ 185              | 6,9 – 9,5                | 1 x 7 x 100                                                     | 6,3 – 12,5                   |                             |                                                                 |                              | 6,1 – 11,3  |
|                   | 185 < Ø ≤ 200              | 7,7                      | 1 x 8 x 100                                                     | 6,9 – 9,5                    |                             |                                                                 |                              | 1 x 7 x 100 |
|                   | PE-RT/AI/PE-RT             | Ø ≤ 20                   | 2,0 – 7,5                                                       | 1 x 1 x 60                   | EI 240                      | 7,7                                                             | 1 x 8 x 100                  |             |
| 2,0               |                            |                          |                                                                 |                              |                             | 1 x 1 x 60                                                      | EI 240                       |             |
| 20 < Ø ≤ 75       |                            | 2,1 – 7,5                |                                                                 |                              |                             |                                                                 | EI 180                       |             |
| PE-X              | Ø ≤ 20                     | 2,0                      | EI 120                                                          |                              | 7,5                         |                                                                 |                              |             |
| PE-X/AI/PE-X      | Ø ≤ 20                     | 7,5                      |                                                                 |                              | 2,0 – 7,5                   | 1 x 1 x 60                                                      | EI 240                       |             |
|                   |                            |                          |                                                                 |                              | 20 < Ø ≤ 75                 |                                                                 |                              | 7,5         |
| PP-R              | Ø ≤ 20                     | 3,4                      | EI 240                                                          |                              |                             |                                                                 |                              |             |
| PP-R/AI/PP-R      | Ø ≤ 20                     | 18,3                     |                                                                 |                              | 1 x 1 x 60                  | 3,4 – 12,5                                                      | 1 x 1 x 60                   | EI 240      |
|                   |                            |                          |                                                                 |                              |                             | 12,6 – 18,4                                                     | 1 x 2 x 60                   |             |
|                   | 20 < Ø ≤ 75                |                          |                                                                 |                              |                             | 12,5                                                            | 1 x 1 x 60                   |             |
|                   |                            |                          |                                                                 |                              |                             | 75 < Ø ≤ 110                                                    | 12,6 – 18,4                  |             |
| PP-R/PP-R-GF/PP-R | Ø ≤ 20                     |                          | 18,3                                                            |                              |                             | EI 180                                                          | 18,4                         |             |
|                   |                            | 2,8 – 12,5               |                                                                 |                              | 1 x 1 x 60                  |                                                                 |                              |             |
|                   | 12,6 – 18,4                | 1 x 2 x 60               |                                                                 |                              |                             |                                                                 |                              |             |
|                   | 12,5                       | 1 x 1 x 60               |                                                                 |                              |                             |                                                                 |                              |             |
|                   | 12,6 – 18,4                | 1 x 2 x 60               |                                                                 |                              |                             |                                                                 |                              |             |
| PP-R/PP-R-GF/PP-R | 75 < Ø ≤ 110               | 18,3                     | EI 180                                                          | 18,4                         | 1 x 1 x 60                  |                                                                 |                              |             |

# INTU FR WRAP L

Intumescent pipe wrap roll

TDS Technical Data Sheet

**INTUSEAL®**  
passive fire protection manufacturer



Isolated non-combustible pipe penetration seals  
with one row of tape INTU FR WRAP L  
rigid wall with thick A ≥ 150 mm  
rigid floor with thick H ≥ 150 mm

Fig.3-4  
page16

| Pipe material | Pipe diameter<br>Ø<br>[mm] | Thickness<br>of FEF<br>insulation<br>[mm] | RIGID WALL                     |                                                                 |                              | RIGID FLOOR                    |                                                                 |                              |
|---------------|----------------------------|-------------------------------------------|--------------------------------|-----------------------------------------------------------------|------------------------------|--------------------------------|-----------------------------------------------------------------|------------------------------|
|               |                            |                                           | Pipe wall<br>thickness<br>[mm] | Tape rows<br>x number of tape<br>wraps x tape<br>thickness [mm] | Configuration<br>C/C and U/C | Pipe wall<br>thickness<br>[mm] | Tape rows<br>x number of tape<br>wraps x tape<br>thickness [mm] | Configuration<br>C/C and U/C |
| Copper        | Ø ≤ 15,0                   | 9                                         | 1,0 – 1,4                      | 1 x 1 x 60                                                      | EI 180                       | ≥ 1,0                          | 1 x 1 x 60                                                      | EI 240                       |
|               |                            | 10 - 22                                   |                                | 1 x 2 x 60                                                      |                              |                                | 1 x 2 x 60                                                      |                              |
|               |                            | 23 – 36                                   |                                | 1 x 3 x 60                                                      |                              |                                | 1 x 3 x 60                                                      |                              |
|               |                            | 37 - 50                                   |                                | 1 x 4 x 60                                                      |                              |                                | 1 x 4 x 60                                                      |                              |
|               |                            | 9                                         | ≥ 1,5                          | 1 x 1 x 60                                                      | EI 240                       |                                |                                                                 |                              |
|               |                            | 10 - 22                                   |                                | 1 x 2 x 60                                                      | EI 180                       |                                |                                                                 |                              |
|               |                            | 23 – 36                                   |                                | 1 x 3 x 60                                                      |                              |                                |                                                                 |                              |
|               |                            | 37 - 50                                   |                                | 1 x 4 x 60                                                      |                              |                                |                                                                 |                              |
|               | 15,0 < Ø<br>≤ 42,4         | 9                                         | 1,4                            | 1 x 1 x 60                                                      | EI 240                       | ≥ 1,4                          | 1 x 1 x 60                                                      | EI 120                       |
|               |                            | 10 - 22                                   | ≥ 1,5                          | 1 x 2 x 60                                                      |                              |                                | EI 180                                                          |                              |
|               |                            | 23 – 36                                   | ≥ 1,4                          | 1 x 3 x 60                                                      | EI 120                       |                                | 1 x 3 x 60                                                      |                              |
|               |                            | 37 - 38                                   |                                | 1 x 4 x 60                                                      |                              |                                | 1 x 4 x 60                                                      |                              |
|               |                            | 39 - 50                                   |                                |                                                                 |                              |                                |                                                                 | 1 x 4 x 60                   |
|               |                            | 15,0 < Ø<br>≤ 44,5                        | 9                              | 1,4                                                             | 1 x 1 x 60                   |                                | EI 180                                                          | ≥ 1,4                        |
|               |                            |                                           | ≥ 1,5                          |                                                                 | EI 240                       | 1 x 2 x 60                     |                                                                 |                              |
|               | 10 – 19                    |                                           | ≥ 1,4                          | 1 x 2 x 60                                                      | EI 180                       | 1 x 3 x 60                     |                                                                 |                              |
|               | 20 - 22                    |                                           |                                | 1 x 3 x 60                                                      | EI 120                       | 1 x 4 x 60                     |                                                                 |                              |
|               | 23 - 36                    |                                           |                                | 1 x 4 x 60                                                      |                              |                                |                                                                 |                              |
|               | 37 - 40                    |                                           |                                |                                                                 |                              |                                |                                                                 |                              |
|               | 41 - 49                    |                                           |                                |                                                                 |                              |                                | EI 180                                                          |                              |
|               | 50                         |                                           |                                |                                                                 |                              |                                |                                                                 |                              |
|               | 44,5 < Ø<br>≤ 54,0         | 9                                         | ≥ 1,5                          | 1 x 1 x 60                                                      | EI 240                       | ≥ 1,5                          | 1 x 1 x 60                                                      | EI 120                       |
|               |                            | 10 - 22                                   |                                | 1 x 2 x 60                                                      | EI 120                       |                                | 1 x 2 x 60                                                      |                              |
|               |                            | 23 – 36                                   |                                | 1 x 3 x 60                                                      |                              |                                | 1 x 3 x 60                                                      |                              |
|               |                            | 37 - 49                                   |                                | 1 x 4 x 60                                                      |                              |                                | 1 x 4 x 60                                                      |                              |
|               |                            | 50                                        |                                |                                                                 |                              |                                |                                                                 |                              |

| Pipe material | Pipe diameter<br>Ø<br>[mm] | Thickness of FEF<br>insulation[mm] | RIGID WALL                     |                                                              |                              |  |
|---------------|----------------------------|------------------------------------|--------------------------------|--------------------------------------------------------------|------------------------------|--|
|               |                            |                                    | Pipe wall<br>thickness<br>[mm] | Tape rows<br>x number of tape wraps x<br>tape thickness [mm] | Configuration<br>C/C and U/C |  |
| Copper        | 54,0 < Ø ≤ 57,0            | 12 – 22                            | ≥ 1,6                          | 1 x 2 x 60                                                   | EI 60                        |  |
|               |                            | 23 – 36                            |                                | 1 x 3 x 60                                                   |                              |  |
|               |                            | 37 - 50                            |                                | 1 x 4 x 60                                                   |                              |  |
|               | 57,0 < Ø ≤ 63,5            | 17 – 22                            |                                | 1 x 2 x 60                                                   |                              |  |
|               |                            | 23 – 36                            |                                | 1 x 3 x 60                                                   |                              |  |
|               |                            | 37 - 50                            |                                | 1 x 4 x 60                                                   |                              |  |
|               | 63,5 < Ø ≤ 70,0            | 23 – 36                            | ≥ 1,7                          | 1 x 3 x 60                                                   |                              |  |
|               |                            | 37 - 50                            |                                | 1 x 4 x 60                                                   |                              |  |
|               | 70,0 < Ø ≤ 76,1            | 26 – 36                            | ≥ 1,8                          | 1 x 3 x 60                                                   |                              |  |
|               |                            | 37 - 50                            |                                | 1 x 4 x 60                                                   |                              |  |
|               | 76,1 < Ø ≤ 82,5            | 31 – 36                            |                                | 1 x 3 x 60                                                   |                              |  |
|               |                            | 37 - 50                            |                                | 1 x 4 x 60                                                   |                              |  |
|               | 82,5 < Ø ≤ 88,9            | 37 - 50                            | ≥ 1,9                          |                                                              |                              |  |
|               | 88,9 < Ø ≤ 101,6           | 46 - 50                            | ≥ 2,0                          |                                                              |                              |  |
|               | 101,6 < Ø ≤ 108,0          | 50                                 |                                |                                                              |                              |  |

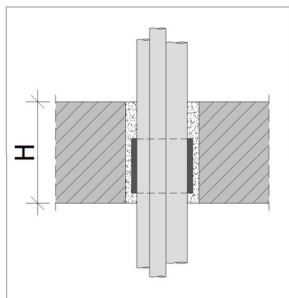
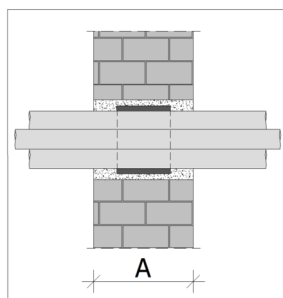
| Pipe material | Pipe diameter<br>Ø<br>[mm] | Thickness of FEF<br>insulation [mm] | RIGID WALL                     |                                                              |                              |
|---------------|----------------------------|-------------------------------------|--------------------------------|--------------------------------------------------------------|------------------------------|
|               |                            |                                     | Pipe wall<br>thickness<br>[mm] | Tape rows<br>x number of tape wraps x<br>tape thickness [mm] | Configuration<br>C/C and U/C |
| Copper        | Ø ≤ 6,35                   | 9                                   | ≥ 0,8                          | 1 x 2 x 60                                                   | EI 240                       |
|               | 6,35 < Ø ≤ 15,88           |                                     | ≥ 1,0                          |                                                              | EI 180                       |

| Pipe material | Pipe diameter Ø [mm] | Thickness of FEF insulation [mm] | RIGID WALL           |                                                        |                           | RIGID FLOOR          |                                                        |                           |  |
|---------------|----------------------|----------------------------------|----------------------|--------------------------------------------------------|---------------------------|----------------------|--------------------------------------------------------|---------------------------|--|
|               |                      |                                  | Pipe wall thick [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C | Pipe wall thick [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |  |
| Steel         | Ø ≤ 42,4             | 9                                | ≥ 2,0                | 1 x 1 x 60                                             | EI 180                    | ≥ 2,0                | 1 x 1 x 60                                             | EI 240                    |  |
|               |                      | 10 - 22                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |  |
|               |                      | 23 - 36                          |                      | 1 x 3 x 60                                             |                           |                      | 1 x 3 x 60                                             |                           |  |
|               |                      | 37 - 50                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |  |
|               | 42,5 < Ø ≤ 44,5      | 9                                | 2,1 – 2,5            | 1 x 1 x 60                                             | EI 180                    | 2,1 – 2,5            | 1 x 1 x 60                                             | EI 120                    |  |
|               |                      | 10 - 22                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |  |
|               |                      | 23 - 36                          |                      | 1 x 3 x 60                                             |                           |                      | 1 x 3 x 60                                             |                           |  |
|               |                      | 37 - 50                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |  |
|               |                      | 9                                | ≥ 2,6                | 1 x 1 x 60                                             | EI 240                    | ≥ 2,6                | 1 x 1 x 60                                             | EI 120                    |  |
|               |                      | 10 - 22                          |                      | 1 x 2 x 60                                             | EI 180                    |                      | 1 x 2 x 60                                             |                           |  |
|               |                      | 23 - 36                          |                      | 1 x 3 x 60                                             |                           |                      | 1 x 3 x 60                                             |                           |  |
|               |                      | 37 - 50                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |  |

| Pipe material | Pipe diameter Ø [mm] | Thickness of FEF insulation [mm] | RIGID WALL           |                                                        |                           | RIGID FLOOR          |                                                        |                           |
|---------------|----------------------|----------------------------------|----------------------|--------------------------------------------------------|---------------------------|----------------------|--------------------------------------------------------|---------------------------|
|               |                      |                                  | Pipe wall thick [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C | Pipe wall thick [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| Steel         | 44,5 < Ø ≤ 54,0      | 9                                | 2,2- 2,5             | 1 x 1 x 60                                             | EI 180                    | 2,2- 2,5             | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 22                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |
|               |                      | 23 - 36                          |                      | 1 x 3 x 60                                             |                           |                      | 1 x 3 x 60                                             |                           |
|               |                      | 37 - 50                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               |                      | 9                                | ≥ 2,6                | 1 x 1 x 60                                             | EI 240                    | ≥ 2,6                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 22                          |                      | 1 x 2 x 60                                             | EI 180                    |                      | 1 x 2 x 60                                             |                           |
|               |                      | 23 - 36                          |                      | 1 x 3 x 60                                             |                           |                      | 1 x 3 x 60                                             |                           |
|               |                      | 37 - 50                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               | 54,0 < Ø ≤ 57,0      | 9                                | 2,2 – 2,5            | 1 x 1 x 60                                             | EI 180                    | 2,3 – 2,5            | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 22                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |
|               |                      | 23 - 36                          |                      | 1 x 3 x 60                                             |                           |                      | 1 x 3 x 60                                             |                           |
|               |                      | 37 - 50                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               |                      | 9                                | ≥ 2,6                | 1 x 1 x 60                                             | EI 240                    | ≥ 2,6                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 22                          |                      | 1 x 2 x 60                                             | EI 180                    |                      | 1 x 2 x 60                                             |                           |
|               |                      | 23 - 36                          |                      | 1 x 3 x 60                                             |                           |                      | 1 x 3 x 60                                             |                           |
|               |                      | 37 - 50                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               | 57,0 < Ø ≤ 63,5      | 9                                | 2,3 – 2,5            | 1 x 1 x 60                                             | EI 180                    | 2,4 – 2,5            | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 22                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |
|               |                      | 23 - 36                          |                      | 1 x 3 x 60                                             |                           |                      | 1 x 3 x 60                                             |                           |
|               |                      | 37 - 50                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               |                      | 9                                | ≥ 2,6                | 1 x 1 x 60                                             | EI 240                    | ≥ 2,6                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 22                          |                      | 1 x 2 x 60                                             | EI 180                    |                      | 1 x 2 x 60                                             |                           |
|               |                      | 23 - 36                          |                      | 1 x 3 x 60                                             |                           |                      | 1 x 3 x 60                                             |                           |
|               |                      | 37 - 50                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               | 63,5 < Ø ≤ 70,0      | 9                                | ≥ 2,4                | 1 x 1 x 60                                             | EI 240                    | ≥ 2,5                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 12                          |                      | 1 x 2 x 60                                             | EI 180                    |                      | 1 x 2 x 60                                             |                           |
|               |                      | 13                               |                      |                                                        |                           | 2,6                  | 1 x 1 x 60                                             | EI 180                    |
|               |                      | 14 - 22                          |                      | ≥ 2,5                                                  |                           | 1 x 2 x 60           | EI 120                                                 |                           |
|               |                      | 23 - 36                          |                      |                                                        |                           | 1 x 3 x 60           |                                                        |                           |
|               |                      | 37 - 50                          |                      |                                                        | 1 x 4 x 60                |                      |                                                        |                           |
|               | 70,0 < Ø ≤ 88,9      | 9                                | ≥ 2,6                | 1 x 1 x 60                                             | EI 240                    | ≥ 2,6                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 12                          |                      | 1 x 2 x 60                                             | EI 180                    |                      |                                                        | EI 180                    |
|               |                      | 13                               |                      |                                                        |                           |                      | 1 x 2 x 60                                             | EI 120                    |
|               |                      | 14 - 22                          |                      | 1 x 2 x 60                                             |                           |                      |                                                        |                           |
|               |                      | 23 - 36                          |                      | 1 x 3 x 60                                             |                           |                      |                                                        |                           |
|               |                      | 37 - 50                          |                      | 1 x 4 x 60                                             |                           |                      |                                                        |                           |
|               | 88,9 < Ø ≤ 101,6     | 9                                | ≥ 2,9                | 1 x 1 x 60                                             | EI 60                     | ≥ 3,1                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 16                          |                      | 1 x 2 x 60                                             | EI 180                    |                      | 1 x 2 x 60                                             |                           |
|               |                      | 17 - 22                          |                      | 1 x 3 x 60                                             |                           |                      | 1 x 3 x 60                                             |                           |
|               |                      | 23 - 34                          |                      | 1 x 3 x 60                                             |                           |                      |                                                        |                           |
|               |                      | 35 - 50                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |

| Pipe material | Pipe diameter Ø [mm] | Thickness of FEF insulation [mm] | RIGID WALL           |                                                        |                           | RIGID FLOOR          |                                                        |                           |
|---------------|----------------------|----------------------------------|----------------------|--------------------------------------------------------|---------------------------|----------------------|--------------------------------------------------------|---------------------------|
|               |                      |                                  | Pipe wall thick [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C | Pipe wall thick [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| Stal          | 101,6 < Ø ≤ 108      | 9                                | ≥ 3,0                | 1 x 1 x 60                                             | EI 60                     | ≥ 3,2                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 16                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |
|               |                      | 17 - 22                          |                      | 1 x 3 x 60                                             | EI 180                    |                      | 1 x 3 x 60                                             |                           |
|               |                      | 23 - 34                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               |                      | 35 - 50                          |                      |                                                        |                           |                      |                                                        |                           |
|               | 108 < Ø ≤ 114,3      | 9                                | ≥ 3,2                | 1 x 1 x 60                                             | EI 60                     | ≥ 3,3                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 16                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |
|               |                      | 17 - 22                          |                      | 1 x 3 x 60                                             | EI 180                    |                      | 1 x 3 x 60                                             |                           |
|               |                      | 23 - 34                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               |                      | 35 - 50                          |                      |                                                        |                           |                      |                                                        |                           |
|               | 114,3 < Ø ≤ 127      | 9                                | ≥ 3,4                | 1 x 1 x 60                                             | EI 60                     | ≥ 3,5                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 16                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |
|               |                      | 17 - 22                          |                      | 1 x 3 x 60                                             | EI 90                     |                      | 1 x 3 x 60                                             |                           |
|               |                      | 23 - 31                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               |                      | 32 - 50                          |                      |                                                        |                           |                      |                                                        |                           |
|               | 127 < Ø ≤ 133        | 9                                | ≥ 3,5                | 1 x 1 x 60                                             | EI 60                     | ≥ 3,6                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 16                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |
|               |                      | 17 - 22                          |                      | 1 x 3 x 60                                             | EI 90                     |                      | 1 x 3 x 60                                             |                           |
|               |                      | 23 - 34                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               |                      | 35 - 50                          |                      |                                                        |                           |                      |                                                        |                           |
|               | 133 < Ø ≤ 139,7      | 9                                | ≥ 3,7                | 1 x 1 x 60                                             | EI 60                     | ≥ 3,7                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 16                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |
|               |                      | 17 - 22                          |                      | 1 x 3 x 60                                             | EI 90                     |                      | 1 x 3 x 60                                             |                           |
|               |                      | 23 - 34                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               |                      | 35 - 50                          |                      |                                                        |                           |                      |                                                        |                           |
|               | 139,7 < Ø ≤ 152,4    | 9                                | ≥ 3,9                | 1 x 1 x 60                                             | EI 60                     | ≥ 3,9                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 16                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |
|               |                      | 17 - 22                          |                      | 1 x 3 x 60                                             | EI 90                     |                      | 1 x 3 x 60                                             |                           |
|               |                      | 23 - 34                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               |                      | 35 - 46                          |                      |                                                        | EI 180                    |                      |                                                        |                           |
|               |                      | 47 - 50                          |                      |                                                        |                           |                      |                                                        |                           |
|               | 152,4 < Ø ≤ 159      | 9                                | ≥ 4,0                | 1 x 1 x 60                                             | EI 60                     | ≥ 4,0                | 1 x 1 x 60                                             | EI 120                    |
|               |                      | 10 - 16                          |                      | 1 x 2 x 60                                             |                           |                      | 1 x 2 x 60                                             |                           |
|               |                      | 17 - 22                          |                      | 1 x 3 x 60                                             | EI 90                     |                      | 1 x 3 x 60                                             |                           |
|               |                      | 23 - 34                          |                      | 1 x 4 x 60                                             |                           |                      | 1 x 4 x 60                                             |                           |
|               |                      | 35 - 49                          |                      |                                                        | EI 180                    |                      |                                                        |                           |
|               |                      | 50                               |                      |                                                        |                           |                      |                                                        |                           |

| Pipe material | Pipe diameter<br>Ø<br>[mm] | Thickness of FEF<br>insulation<br>[mm] | RIGID WALL              |                                                              |                              |
|---------------|----------------------------|----------------------------------------|-------------------------|--------------------------------------------------------------|------------------------------|
|               |                            |                                        | Pipe wall thick<br>[mm] | Tape rows<br>x number of tape wraps x<br>tape thickness [mm] | Configuration<br>C/C and U/C |
| Steel         | 159 < Ø ≤ 169              | 16 - 23                                | ≥ 4,0                   | 1 x 2 x 60                                                   | EI 60                        |
|               |                            | 24 – 6                                 |                         | 1 x 3 x 60                                                   |                              |
|               |                            | 37 – 49                                |                         | 1 x 4 x 60                                                   |                              |
|               |                            | 50                                     |                         |                                                              |                              |
|               | 169 < Ø ≤ 180              | 24 – 36                                |                         | 1 x 3 x 60                                                   | EI 60                        |
|               |                            | 37 – 49                                |                         | 1 x 4 x 60                                                   | EI 90                        |
|               |                            | 50                                     |                         |                                                              | EI 60                        |
|               | 180 < Ø ≤ 200              | 38 – 49                                |                         |                                                              | EI 90                        |
|               | 200 < Ø ≤ 219              | 50                                     |                         |                                                              |                              |

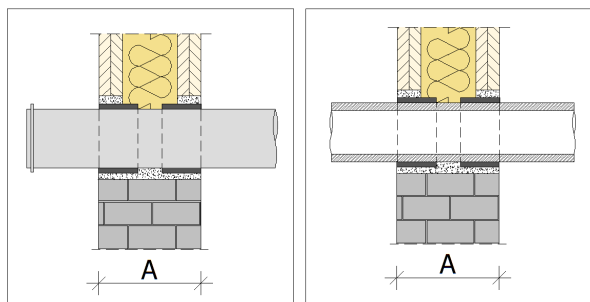


Bundle of pipes penetration seals with one row  
of tape INTU FR WRAP L  
rigid wall with thick A ≥ 150 mm  
rigid floor with thick H ≥ 150 mm

Fig.5-6  
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| One bundle                         | Pipe diameter<br>Ø<br>[mm] | Thickness of PE<br>insulation<br>[mm] | RIGID WALL              |                                                              |                              |
|------------------------------------|----------------------------|---------------------------------------|-------------------------|--------------------------------------------------------------|------------------------------|
|                                    |                            |                                       | Pipe wall thick<br>[mm] | Tape rows<br>x number of tape wraps<br>x tape thickness [mm] | Configuration<br>C/C and U/C |
| 1) Copper pipe                     | Ø ≤ 6,35                   | 9                                     | ≥ 0,8                   | 1 x 2 x 60                                                   | EI 180                       |
| 2) Copper pipe                     | Ø ≤ 6,35                   | 9                                     | ≥ 1,0                   |                                                              |                              |
| 1) Pipe PE-HD or ABS<br>or SAN+PVC | Ø ≤ 32                     | -                                     | 2,0                     | 1 x 1 x 60                                                   | EI 240                       |
| 2) Pipe PVC                        | Ø ≤ 50                     |                                       | 1,8                     |                                                              |                              |

| One bundle     | Pipe diameter<br>Ø<br>[mm] | Thickness of PE<br>insulation<br>[mm] | RIGID FLOOR             |                                                              |                              |
|----------------|----------------------------|---------------------------------------|-------------------------|--------------------------------------------------------------|------------------------------|
|                |                            |                                       | Pipe wall thick<br>[mm] | Tape rows<br>x number of tape wraps<br>x tape thickness [mm] | Configuration<br>C/C and U/C |
| 1) Copper pipe | Ø ≤ 15,88                  | 9                                     | ≥ 1,0                   | 1 x 2 x 60                                                   | EI 180                       |
| 2) Copper pipe | Ø ≤ 6,35                   | 9                                     | ≥ 0,8                   |                                                              |                              |



Combustible and isolated non-combustible pipe penetration seals  
with two rows of tape INTU FR WRAP L  
flexible wall  $A \geq 125$  mm

Fig.7-8  
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| Pipe material                   | Pipe diameter<br>Ø<br>[mm] | FLEXIBLE / RIGID WALLS |                                                              |                              |
|---------------------------------|----------------------------|------------------------|--------------------------------------------------------------|------------------------------|
|                                 |                            | Pipe wall thick [mm]   | Tape rows<br>x number of tape wraps x tape<br>thickness [mm] | Configuration<br>C/C and U/C |
| PVC                             | Ø ≤ 50                     | 1,8 – 3,6              | 2 x 1 x 60                                                   | EI 120                       |
|                                 |                            | 3,7 – 4,2              | 2 x 2 x 60                                                   |                              |
|                                 | 50 < Ø ≤ 75                | 1,9 – 3,6              | 2 x 1 x 60                                                   |                              |
|                                 |                            | 3,7 – 4,2              | 2 x 2 x 60                                                   |                              |
|                                 | 75 < Ø ≤ 90                | 2,1 – 4,2              |                                                              |                              |
|                                 | 90 < Ø ≤ 110               | 2,2 – 4,2              |                                                              |                              |
| PE-HD<br><br>ABS<br><br>SAN+PVC | Ø ≤ 32                     | 2,0 – 3,0              | 2 x 1 x 60                                                   | EI 120                       |
|                                 |                            | 3,1 – 6,8              |                                                              | EI 90                        |
|                                 |                            | 6,9 – 10,0             | 2 x 2 x 60                                                   | EI 120                       |
|                                 | 32 < Ø ≤ 40                | 2,2 – 3,0              | 2 x 1 x 60                                                   | EI 120                       |
|                                 |                            | 3,1 – 6,8              |                                                              | EI 90                        |
|                                 |                            | 6,9 – 10,0             | 2 x 2 x 60                                                   | EI 120                       |
|                                 | 40 < Ø ≤ 50                | 2,5 – 3,0              | 2 x 1 x 60                                                   | EI 120                       |
|                                 |                            | 3,1 – 6,8              |                                                              | EI 90                        |
|                                 |                            | 6,9 – 10,0             | 2 x 2 x 60                                                   | EI 120                       |
|                                 | 50 < Ø ≤ 55                | 2,6 – 3,0              | 2 x 1 x 60                                                   | EI 120                       |
|                                 |                            | 3,1 – 6,8              |                                                              | EI 90                        |
|                                 |                            | 6,9 – 10,0             | 2 x 2 x 60                                                   | EI 120                       |
|                                 | 55 < Ø ≤ 63                | 2,8 – 3,0              | 2 x 1 x 60                                                   | EI 120                       |
|                                 |                            | 3,1 – 6,8              |                                                              | EI 90                        |
|                                 |                            | 6,9 – 10,0             | 2 x 2 x 60                                                   | EI 120                       |
|                                 | 63 < Ø ≤ 75                | 3,0                    | 2 x 1 x 60                                                   | EI 120                       |
|                                 |                            | 3,1 – 6,8              |                                                              | EI 90                        |
|                                 |                            | 6,9 – 10,0             | 2 x 2 x 60                                                   | EI 120                       |
|                                 | 75 < Ø ≤ 90                | 3,6 – 10,0             | 2 x 2 x 60                                                   | EI 120                       |
|                                 | 90 < Ø ≤ 110               | 4,2 – 10,0             |                                                              |                              |

| Pipe material | Pipe diameter<br>Ø<br>[mm] | FLEXIBLE / RIGID WALLS |                                                              |                              |
|---------------|----------------------------|------------------------|--------------------------------------------------------------|------------------------------|
|               |                            | Pipe wall thick [mm]   | Tape rows<br>x number of tape wraps x tape<br>thickness [mm] | Configuration<br>C/C and U/C |
| PP            | Ø ≤ 50                     | 1,8 – 12,5             | 2 x 1 x 60                                                   | EI 120                       |
|               |                            | 12,6 – 18,4            | 2 x 2 x 60                                                   | EI 90                        |
|               | 50 < Ø ≤ 75                | 1,9 – 12,5             | 2 x 1 x 60                                                   | EI 120                       |
|               |                            | 12,6 – 18,4            | 2 x 2 x 60                                                   | EI 90                        |
|               | 75 < Ø ≤ 90                | 2,3 – 8,3              | 2 x 2 x 60                                                   | EI 120                       |
|               |                            | 8,4 – 8,4              |                                                              | EI 90                        |
|               | 90 < Ø ≤ 110               | 2,7                    | 2 x 2 x 60                                                   | EI 120                       |
|               |                            | 2,8 – 18,4             |                                                              | EI 90                        |

| Pipe material | Pipe diameter<br>Ø<br>[mm] | Thickness of FEF<br>insulation<br>[mm] | FLEXIBLE / RIGID WALLS  |                                                              |                              |
|---------------|----------------------------|----------------------------------------|-------------------------|--------------------------------------------------------------|------------------------------|
|               |                            |                                        | Pipe wall thick<br>[mm] | Tape rows<br>x number of tape wraps x<br>tape thickness [mm] | Configuration<br>C/C and U/C |
| Steel         | Ø ≤ 42,4                   | 9                                      | ≥ 2,0                   | 2 x 1 x 60                                                   | EI 120                       |
|               |                            | 10 – 22                                |                         | 2 x 2 x 60                                                   |                              |
|               |                            | 23 – 34                                |                         | 2 x 3 x 60                                                   |                              |
|               |                            | 35 – 50                                |                         | 2 x 4 x 60                                                   |                              |
|               | 42,4 < Ø ≤ 44,5            | 9                                      | ≥ 2,1                   | 2 x 1 x 60                                                   | EI 90                        |
|               |                            | 10 – 11                                |                         | 2 x 2 x 60                                                   | EI 120                       |
|               |                            | 12 – 22                                |                         | 2 x 3 x 60                                                   |                              |
|               |                            | 23 – 34                                |                         | 2 x 4 x 60                                                   |                              |
|               |                            | 35 – 50                                |                         | 2 x 4 x 60                                                   |                              |
|               | 44,5 < Ø ≤ 54,0            | 9                                      | ≥ 2,2                   | 2 x 1 x 60                                                   | EI 90                        |
|               |                            | 10 – 20                                |                         | 2 x 2 x 60                                                   | EI 120                       |
|               |                            | 21 – 22                                |                         | 2 x 3 x 60                                                   |                              |
|               |                            | 23 – 34                                |                         | 2 x 4 x 60                                                   |                              |
|               |                            | 35 – 50                                |                         | 2 x 4 x 60                                                   |                              |
|               | 54,0 < Ø ≤ 57,0            | 9                                      | ≥ 2,2                   | 2 x 1 x 60                                                   | EI 90                        |
|               |                            | 10 – 22                                |                         | 2 x 2 x 60                                                   | EI 120                       |
|               |                            | 23 – 34                                |                         | 2 x 3 x 60                                                   |                              |
|               |                            | 35 – 50                                |                         | 2 x 4 x 60                                                   |                              |
|               | 57,0 < Ø ≤ 63,5            | 9                                      | ≥ 2,3                   | 2 x 1 x 60                                                   | EI 90                        |
|               |                            | 10 – 22                                |                         | 2 x 2 x 60                                                   | EI 120                       |
|               |                            | 23 – 28                                |                         | 2 x 3 x 60                                                   |                              |
|               |                            | 29 – 34                                |                         | 2 x 4 x 60                                                   |                              |
|               |                            | 35 – 50                                |                         | 2 x 4 x 60                                                   |                              |
|               | 63,5 < Ø ≤ 70,0            | 9                                      | ≥ 2,4                   | 2 x 1 x 60                                                   | EI 90                        |
|               |                            | 10 – 22                                |                         | 2 x 2 x 60                                                   | EI 120                       |
|               |                            | 23 – 34                                |                         | 2 x 3 x 60                                                   |                              |
|               |                            | 35 – 50                                |                         | 2 x 4 x 60                                                   |                              |
|               | 70,0 < Ø ≤ 76,1            | 9                                      | ≥ 2,5                   | 2 x 1 x 60                                                   | EI 90                        |
|               |                            | 10 – 22                                |                         | 2 x 2 x 60                                                   |                              |
|               |                            | 23 – 34                                |                         | 2 x 3 x 60                                                   |                              |
|               |                            | 35 – 39                                |                         | 2 x 4 x 60                                                   |                              |
|               |                            | 40 – 50                                |                         | 2 x 4 x 60                                                   | EI 120                       |

| Pipe material | Pipe diameter Ø [mm] | Thickness of FEF insulation [mm] | FLEXIBLE / RIGID WALLS |                                                        |                           |
|---------------|----------------------|----------------------------------|------------------------|--------------------------------------------------------|---------------------------|
|               |                      |                                  | Pipe wall thick [mm]   | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| Steel         | 76,1 < Ø ≤ 82,5      | 9                                | ≥ 2,6                  | 2 x 1 x 60                                             | EI 90                     |
|               |                      | 10 – 22                          |                        | 2 x 2 x 60                                             |                           |
|               |                      | 23 – 34                          |                        | 2 x 3 x 60                                             |                           |
|               |                      | 35 – 45                          |                        | 2 x 4 x 60                                             |                           |
|               |                      | 46 – 50                          |                        |                                                        | EI 120                    |
|               | 82,5 < Ø ≤ 88,9      | 9                                |                        | 2 x 1 x 60                                             | EI 90                     |
|               |                      | 10 – 22                          |                        | 2 x 2 x 60                                             |                           |
|               |                      | 23 – 34                          |                        | 2 x 3 x 60                                             |                           |
|               |                      | 35 – 49                          |                        | 2 x 4 x 60                                             |                           |
|               |                      | 50                               |                        |                                                        | EI 120                    |

- Combustible pipes with insulation according with Classification Report No. 01988.2/22/ZOONZP

Based Classification Table 1. With PE insulation

| Pipe material     | PE insulation thickness | Pipe diameter Ø [mm] | FLEXIBLE / RIGID WALL ≥ 125 mm |                                                        |                           |
|-------------------|-------------------------|----------------------|--------------------------------|--------------------------------------------------------|---------------------------|
|                   |                         |                      | Pipe wall thickness [mm]       | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| PE-RT/AL/PE-RT    | 9 mm                    | Ø ≤ 20               | 2,0                            | 2 x 1 x 60                                             | EI 120                    |
|                   |                         | Ø ≤ 32               | 3,0                            | 2 x 1 x 60                                             | EI 120                    |
| PP-R/PP-R-GF/PP-R | 9 mm                    | Ø ≤ 20               | 2,8 – 3,4                      | 2 x 1 x 60                                             | EI 120                    |
|                   |                         | Ø ≤ 50               | 5,9 – 8,9                      | 2 x 1 x 60                                             | EI 120                    |
| PE-X/AL/PE-X      | 9 mm                    | Ø ≤ 20               | 2,0                            | 2 x 1 x 60                                             | EI 120                    |
|                   |                         | Ø ≤ 32               | 3,0                            | 2 x 1 x 60                                             | EI 120                    |

| Pipe material     | PE insulation thickness | Pipe diameter Ø [mm] | RIGID WALL ≥ 150 mm      |                                                        |                           |
|-------------------|-------------------------|----------------------|--------------------------|--------------------------------------------------------|---------------------------|
|                   |                         |                      | Pipe wall thickness [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| PE-RT/AL/PE-RT    | 9 mm                    | Ø ≤ 20               | 2,0                      | 1 x 1 x 60                                             | EI 120                    |
|                   |                         | Ø ≤ 32               | 3,0                      | 1 x 1 x 60                                             | EI 120                    |
| PP-R/PP-R-GF/PP-R | 9 mm                    | Ø ≤ 20               | 2,8 – 3,4                | 1 x 1 x 60                                             | EI 120                    |
|                   |                         | Ø ≤ 50               | 5,9 – 8,9                | 1 x 1 x 60                                             | EI 120                    |
| PE-X/AL/PE-X      | 9 mm                    | Ø ≤ 20               | 2,0                      | 1 x 1 x 60                                             | EI 120                    |
|                   |                         | Ø ≤ 32               | 3,0                      | 1 x 1 x 60                                             | EI 120                    |
| PVC               | 9 mm                    | Ø ≤ 32               | 2,0                      | 1 x 2 x 60                                             | EI 120                    |
| PP                | 9 mm                    | Ø ≤ 75               | 2,7                      | 1 x 1 x 60                                             | EI 60                     |
|                   | 13 mm                   | Ø ≤ 110              | 12,5                     | 1 x 2 x 60                                             | EI 60                     |

Based Classification Table 2. With FEF insulation

| Pipe material     | FEF insulation thickness | Pipe diameter Ø [mm] | RIGID WALL ≥ 150 mm      |                                                        |                           |
|-------------------|--------------------------|----------------------|--------------------------|--------------------------------------------------------|---------------------------|
|                   |                          |                      | Pipe wall thickness [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| PE - HD           | 9 mm                     | Ø ≤ 110              | 10,0                     | 1 x 2 x 60                                             | EI 240                    |
|                   | 13 mm                    | Ø ≤ 110              | 4,2 – 10,0               | 1 x 3 x 60                                             | EI 120                    |
|                   | 13 mm                    | Ø ≤ 125              | 4,8 – 14,5               | 1 x 4 x 100                                            | EI 60                     |
|                   | 13 mm                    |                      | 14,6                     | 1 x 4 x 100                                            | EI 90                     |
|                   | 13 mm                    | Ø ≤ 160              | 6,2 – 14,5               | 1 x 6 x 100                                            | EI 60                     |
|                   | 13 mm                    |                      | 14,6                     | 1 x 6 x 100                                            | EI 90                     |
| PP                | 9 mm                     | Ø ≤ 110              | 2,7                      | 1 x 2 x 60                                             | EI 120                    |
|                   | 13 mm                    |                      | 2,7 – 18,3               | 1 x 3 x 60                                             | EI 120                    |
| PP-R              | 9 mm                     | Ø ≤ 110              | 18,3                     | 1 x 2 x 60                                             | EI 120                    |
| PP-R/PP-R-GF/PP-R | 9 mm                     | Ø ≤ 110              | 18,3                     | 1 x 2 x 60                                             | EI 120                    |

Based Classification Table 3. With mineral wool insulation

| Pipe material | Mineral wool insulation thickness | Pipe diameter Ø [mm] | FLEXIBLE / RIGID WALL ≥ 125 mm |                                                        |                           |
|---------------|-----------------------------------|----------------------|--------------------------------|--------------------------------------------------------|---------------------------|
|               |                                   |                      | Pipe wall thickness [mm]       | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| PP-R          | 20 mm                             | Ø ≤ 20               | 2,3                            | 2 x 2 x 60                                             | EI 120                    |
|               | 30 mm                             | Ø ≤ 75               | 6,8 – 12,5                     | 2 x 3 x 60                                             | EI 120                    |

| Pipe material | Mineral wool insulation thickness | Pipe diameter Ø [mm] | RIGID FLOOR ≥ 150 mm     |                                                        |                           |
|---------------|-----------------------------------|----------------------|--------------------------|--------------------------------------------------------|---------------------------|
|               |                                   |                      | Pipe wall thickness [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| PP-R          | 20 mm                             | Ø ≤ 20               | 2,3 – 3,4                | 1 x 1 x 60                                             | EI 120                    |
|               | 30 mm                             | Ø ≤ 20               | 6,8 – 12,5               | 1 x 3 x 60                                             | EI 120                    |
|               | 30 mm                             | Ø ≤ 75               | 6,8 – 12,5               | 1 x 3 x 60                                             | EI 120                    |

- AROT pipes with insulation according with Classification Report No. 01988.2/22/Z00NZP

| Conduit diameter [mm] | Services inside                                                      | Tape rows x number of tape wraps x tape thickness [mm] | Fire resistance class |
|-----------------------|----------------------------------------------------------------------|--------------------------------------------------------|-----------------------|
| Ø ≤ 110               | Empty                                                                | 2 x 2 x 60                                             | EI 120 – U/U          |
|                       | Ø <sub>CABLE</sub> ≤ 21mm                                            |                                                        |                       |
|                       | Ø <sub>BUNDLE</sub> ≤ Ø <sub>CONDUIT</sub> Ø <sub>CABLE</sub> ≤ 21mm |                                                        |                       |

- Non-combustible pipes with insulation according with Classification Report No. 01988.2/22/Z00NZP

Based Classification Table 4. With mineral wool insulation

| Pipe material | Mineral wool insulation thickness x minimum length | Pipe diameter Ø [mm] | FLEXIBLE / RIGID WALL ≥ 125 mm |                                                        |                           |
|---------------|----------------------------------------------------|----------------------|--------------------------------|--------------------------------------------------------|---------------------------|
|               |                                                    |                      | Pipe wall thickness [mm]       | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| Steel         | 20 x 300 mm                                        | Ø ≤ 42,4             | ≥ 1,5                          | 2 x 1 x 60                                             | EI 120                    |
|               | 20 ÷ 30 mm x 500 mm                                |                      | ≥ 2,0                          | 2 x 1 x 60                                             | EI 120                    |
|               | 20 ÷ 40 mm x 600 mm                                |                      | ≥ 2,0                          | 2 x 1 x 60                                             | EI 120                    |
|               | 40 ÷ 50 mm x 750 mm                                |                      | ≥ 5,6                          | 2 x 1 x 60                                             | EI 120                    |
|               | 30 mm x 500 mm                                     | Ø ≤ 66,7             | ≥ 1,5                          | 2 x 1 x 60                                             | EI 120                    |
|               | 30 ÷ 40 mm x 500 mm                                |                      | ≥ 2,0                          | 2 x 1 x 60                                             | EI 120                    |
|               | 40 ÷ 50 mm x 750 mm                                |                      | ≥ 5,6                          | 2 x 1 x 60                                             | EI 120                    |
|               | 40 mm x 600 mm                                     | Ø ≤ 108,0            | ≥ 2,0                          | 2 x 1 x 60                                             | EI 120                    |
|               | 40 ÷ 50 mm x 750 mm                                |                      | ≥ 5,6                          | 2 x 1 x 60                                             | EI 120                    |
|               | 40 mm x 600 mm                                     | Ø ≤ 114,3            | ≥ 3,6                          | 2 x 1 x 60                                             | EI 120                    |
|               | 40 ÷ 50 mm x 750 mm                                |                      | ≥ 3,6                          | 2 x 1 x 60                                             | EI 120                    |
|               | 50 mm x 750 mm                                     | Ø ≤ 168,3            | ≥ 5,6                          | 2 x 1 x 60                                             | EI 120                    |
|               | 50 mm x 750 mm                                     | Ø ≤ 219,1            | ≥ 5,6                          | 2 x 1 x 60                                             | EI 120                    |
|               | 50 mm x 750 mm                                     | Ø ≤ 273,0            | ≥ 5,6                          | 2 x 1 x 60                                             | EI 120                    |
|               | 50 mm x 750 mm                                     | Ø ≤ 323,9            | ≥ 5,6                          | 2 x 1 x 60                                             | EI 120                    |
|               | 50 mm x 750 mm                                     | Ø ≤ 355,6            | ≥ 5,6                          | 2 x 1 x 60                                             | EI 120                    |

| Pipe material | Mineral wool insulation thickness x minimum length | Pipe diameter Ø [mm] | FLEXIBLE / RIGID WALL ≥ 125 mm |                                                        |                           |
|---------------|----------------------------------------------------|----------------------|--------------------------------|--------------------------------------------------------|---------------------------|
|               |                                                    |                      | Pipe wall thickness [mm]       | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| Steel         | 20 mm x 300 mm                                     | Ø ≤ 42,4             | ≥ 1,5                          | 1 x 1 x 60                                             | EI 120                    |
|               | 20 ÷ 30 mm x 500 mm                                |                      | ≥ 1,5                          | 1 x 1 x 60                                             | EI 120                    |
|               | 20 ÷ 40 mm x 600 mm                                |                      | ≥ 2,0                          | 1 x 1 x 60                                             | EI 120                    |
|               | 20 mm x 500 mm                                     | Ø ≤ 66,7             | ≥ 1,5                          | 1 x 1 x 60                                             | EI 120                    |
|               | 30 ÷ 40 mm x 600 mm                                |                      | ≥ 2,0                          | 1 x 1 x 60                                             | EI 120                    |
|               | 40 mm x 600 mm                                     | Ø ≤ 108,0            | ≥ 2,0                          | 1 x 1 x 60                                             | EI 120                    |

| Pipe material | Mineral wool insulation thickness x minimum length | Pipe diameter Ø [mm] | RIGID FLOOR ≥ 150 mm     |                                                        |                           |
|---------------|----------------------------------------------------|----------------------|--------------------------|--------------------------------------------------------|---------------------------|
|               |                                                    |                      | Pipe wall thickness [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| Steel         | 20 mm x 300 mm                                     | Ø ≤ 42,4             | ≥ 1,5                    | 1 x 1 x 60                                             | EI 120                    |
|               | 20 ÷ 30 mm x 500 mm                                |                      | ≥ 1,5                    | 1 x 1 x 60                                             | EI 120                    |
|               | 20 ÷ 40 mm x 600 mm                                |                      | ≥ 2,0                    | 1 x 1 x 60                                             | EI 120                    |
|               | 20 ÷ 50 mm x 600 mm                                |                      | ≥ 4,0                    | 1 x 1 x 60                                             | EI 120                    |
|               | 30 mm x 500 mm                                     | Ø ≤ 66,7             | ≥ 1,5                    | 1 x 1 x 60                                             | EI 120                    |
|               | 30 ÷ 40 mm x 600 mm                                |                      | ≥ 2,0                    | 1 x 1 x 60                                             | EI 120                    |
|               | 30 ÷ 50 mm x 600 mm                                |                      | ≥ 4,0                    | 1 x 1 x 60                                             | EI 120                    |

| Pipe material | Mineral wool insulation thickness x minimum length | Pipe diameter Ø [mm] | RIGID FLOOR ≥ 150 mm     |                                                        |                           |
|---------------|----------------------------------------------------|----------------------|--------------------------|--------------------------------------------------------|---------------------------|
|               |                                                    |                      | Pipe wall thickness [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| Steel         | 40 mm x 600 mm                                     | Ø ≤ 108,0            | ≥ 2,0                    | 1 x 1 x 60                                             | EI 120                    |
|               | 40 ÷ 50 mm x 600 mm                                |                      | ≥ 4,0                    | 1 x 1 x 60                                             | EI 120                    |
|               | 50 mm x 600 mm                                     | Ø ≤ 114,3            | ≥ 4,0                    | 1 x 1 x 60                                             | EI 120                    |
|               | 50 mm x 600 mm                                     | Ø ≤ 139,7            | ≥ 4,0                    | 1 x 1 x 60                                             | EI 120                    |
|               | 50 mm x 600 mm                                     | Ø ≤ 168,3            | ≥ 4,0                    | 1 x 1 x 60                                             | EI 120                    |

Based Classification Table 5. With FEF insulation

| Pipe material | FEF insulation thickness | Pipe diameter Ø [mm] | RIGID WALL ≥ 150 mm      |                                                        |                           |
|---------------|--------------------------|----------------------|--------------------------|--------------------------------------------------------|---------------------------|
|               |                          |                      | Pipe wall thickness [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| Steel         | 9                        | Ø ≤ 108,0            | ≥ 1,2 – 2,0              | 1 x 1 x 60                                             | EI 120                    |
|               | 10 – 22                  |                      |                          | 1 x 2 x 60                                             | EI 120                    |
|               | 23 – 36                  |                      |                          | 1 x 3 x 60                                             | EI 120                    |
|               | 37 - 50                  |                      |                          | 1 x 4 x 60                                             | EI 120                    |
|               | 50                       | Ø ≤ 114,3            | ≥ 2,2                    | 1 x 4 x 60                                             | EI 120                    |
|               | 50                       | Ø ≤ 139,7            | ≥ 3,1                    | 1 x 4 x 60                                             | EI 120                    |
|               | 50                       | Ø ≤ 168,3            | ≥ 4,0                    | 1 x 4 x 60                                             | EI 120                    |
|               | 50 <sup>1)</sup>         | Ø ≤ 219,1            | ≥ 4,0                    | 1 x 4 x 60                                             | EI 120                    |
|               | 50 <sup>2)</sup>         | Ø ≤ 273,0            | ≥ 4,6                    | 1 x 4 x 60                                             | EI 120                    |
|               | 50 <sup>2)</sup>         | Ø ≤ 323,9            | ≥ 5,2                    | 1 x 4 x 60                                             | EI 120                    |
|               | 50 <sup>2)</sup>         | Ø ≤ 355,6            | ≥ 5,6                    | 1 x 4 x 60                                             | EI 120                    |

Pipe additionally insulated with mineral wool density ≥ 35 kg/m³, local insulation (case LI):

1) dimensions of: 40 x 500 mm (thickness x length)

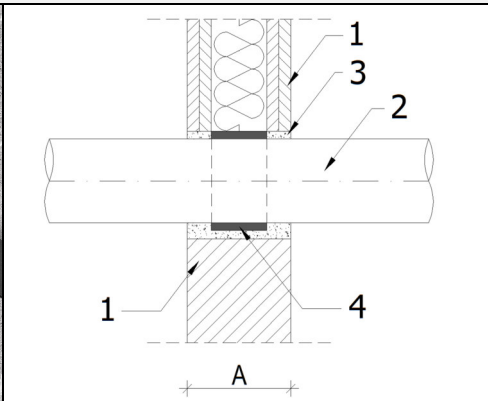
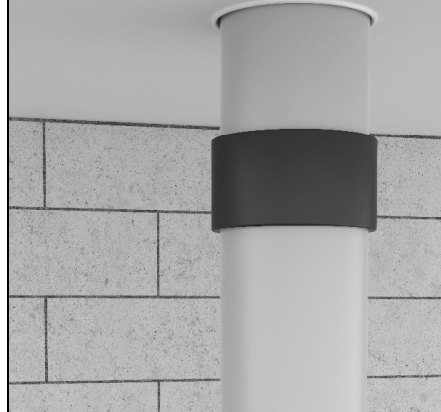
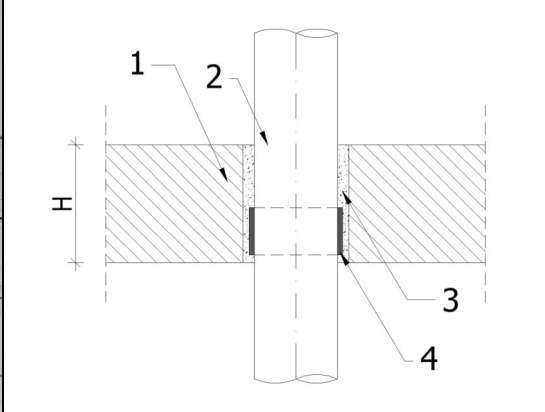
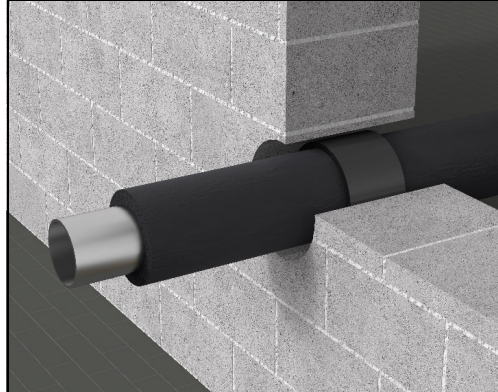
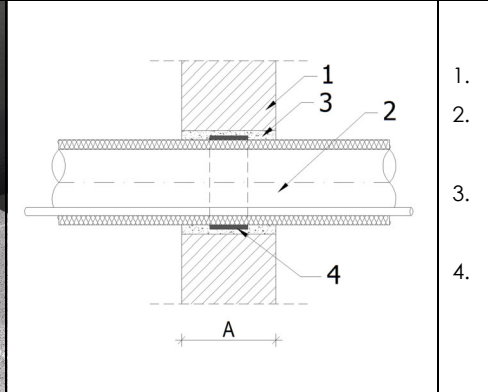
2) dimensions of: 50 x 500 mm (thickness x length)

| Pipe material | FEF insulation thickness | Pipe diameter Ø [mm] | RIGID WALL ≥ 150 mm      |                                                        |                           |
|---------------|--------------------------|----------------------|--------------------------|--------------------------------------------------------|---------------------------|
|               |                          |                      | Pipe wall thickness [mm] | Tape rows x number of tape wraps x tape thickness [mm] | Configuration C/C and U/C |
| Steel         | 9                        | Ø ≤ 108,0            | ≥ 1,2 – 2,0              | 1 x 1 x 60                                             | EI 120                    |
|               | 10 – 22                  |                      |                          | 1 x 2 x 60                                             | EI 120                    |
|               | 23 – 36                  |                      |                          | 1 x 3 x 60                                             | EI 120                    |
|               | 37 - 50                  |                      |                          | 1 x 4 x 60                                             | EI 120                    |
|               | 50                       | Ø ≤ 114,3            | ≥ 2,2                    | 1 x 4 x 60                                             | EI 120                    |
|               | 50                       | Ø ≤ 139,7            | ≥ 3,1                    | 1 x 4 x 60                                             | EI 120                    |
|               | 50                       | Ø ≤ 168,3            | ≥ 4,0                    | 1 x 4 x 60                                             | EI 120                    |
|               | 50 <sup>1)</sup>         | Ø ≤ 219,1            | ≥ 4,0                    | 1 x 4 x 60                                             | EI 90                     |
|               | 50 <sup>1)</sup>         | Ø ≤ 273,0            | ≥ 4,6                    | 1 x 4 x 60                                             | EI 90                     |
|               | 50 <sup>1)</sup>         | Ø ≤ 323,9            | ≥ 5,2                    | 1 x 4 x 60                                             | EI 90                     |
|               | 50 <sup>1)</sup>         | Ø ≤ 355,6            | ≥ 5,6                    | 1 x 4 x 60                                             | EI 90                     |

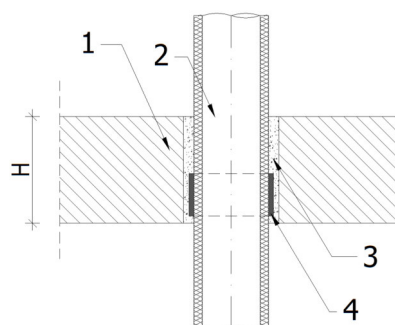
Pipe additionally insulated with mineral wool density ≥ 35 kg/m³, local insulation (case LI):

1) dimensions of: 50 x 700 mm (thickness x length)

## ➔ SOLUTION DETAILS

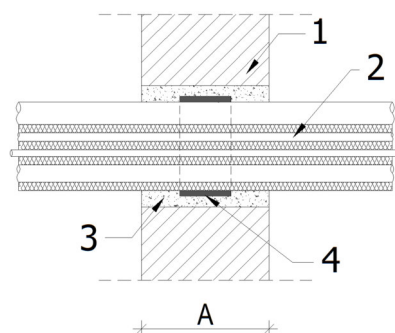
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Fig.1</b>                                                                       | <b>Combustible pipes penetration seals in walls</b>                                                                                                                                                                                                                                                                                                                                                                                      |
|    |  <ol style="list-style-type: none"> <li>1. Flexible / rigid wall, <math>A \geq 100</math> mm</li> <li>2. Combustible pipe</li> <li>3. Gap filling with cement mortar or <b>INTU FR MASTIC</b> mass</li> <li>4. <b>INTU FR WRAP L</b> tape, one row in partition axis</li> </ol>                                                                        |
| <b>Fig.2</b>                                                                       | <b>Combustible pipes penetration seals in floor</b>                                                                                                                                                                                                                                                                                                                                                                                      |
|   |  <ol style="list-style-type: none"> <li>1. Rigid floor, <math>H \geq 150</math> mm</li> <li>2. Combustible pipe</li> <li>3. Gap filling with cement mortar or <b>INTU FR MASTIC</b> mass</li> <li>4. <b>INTU FR WRAP L</b> tape, one row, maximum 10 mm from the bottom of the floor</li> </ol>                                                       |
| <b>Fig.3</b>                                                                       | <b>Metal pipe in continuous flammable insulation – in wall</b>                                                                                                                                                                                                                                                                                                                                                                           |
|  |  <ol style="list-style-type: none"> <li>1. Flexible or rigid wall, <math>A \geq 100</math> mm</li> <li>2. Metal pipe with/without heating cable in continuous insulation</li> <li>3. Gap filled with cement mortar or <b>INTU FR MASTIC</b> mass</li> <li>4. <b>INTU FR WRAP L</b> tape (single row, placed in the wall thickness center)</li> </ol> |

**Fig.4** Metal pipe in continuous flammable insulation – in floor



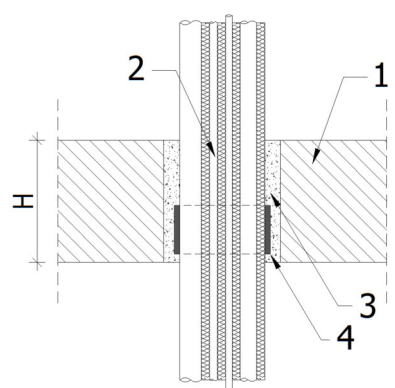
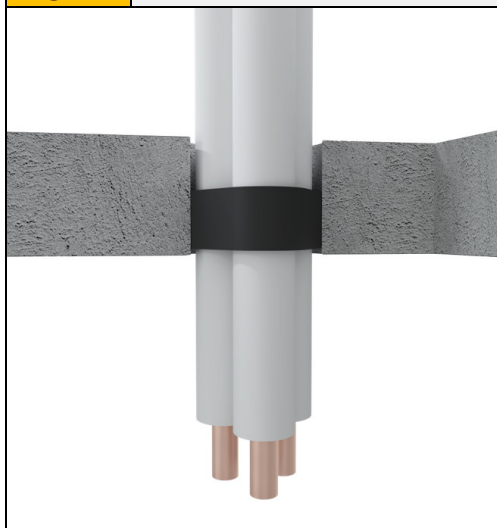
1. Rigid floor,  $H \geq 150$  mm
2. Metal pipe with/without heating cable in continuous insulation
3. Gap filled with cement mortar or **INTU FR MASTIC** mass
4. **INTU FR WRAP L** tape, one row, maximum 10 mm from the bottom of the floor

**Fig.5** Air-conditioning bundle in wall



1. Flexible or rigid wall,  $A \geq 100$  mm
2. Bundle of combustible pipes / noncombustible pipes and cables
3. Gap filled with cement mortar or **INTU FR MASTIC** mass
4. **INTU FR WRAP L** tape, one row in partition axis

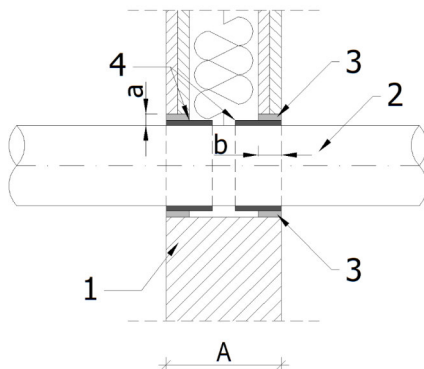
**Fig.6** Air-conditioning bundle in floor



1. Rigid floor,  $H \geq 150$  mm
2. Bundle of combustible pipes / noncombustible pipes and cables
3. Gap filled with cement mortar or **INTU FR MASTIC** mass
4. **INTU FR WRAP L** tape, one row in partition axis

**Fig.7**

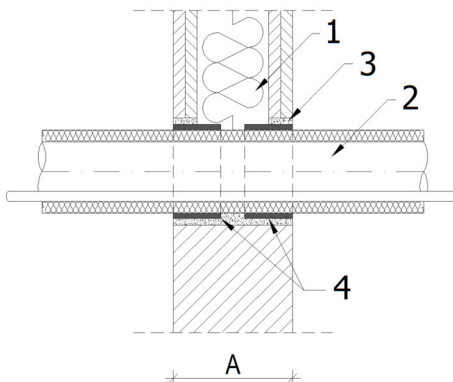
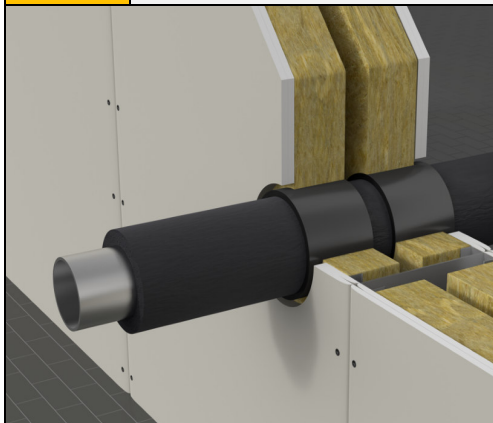
Combustible pipes penetration seals - in walls



1. Flexible / rigid wall,  $A \geq 125$  mm
2. Combustible pipe
3. Gap filling with cement mortar or **INTU FR MASTIC** mass
4. **INTU FR WRAP L** tape, double row, on both sides of the partition, flush with its edge

**Fig.8**

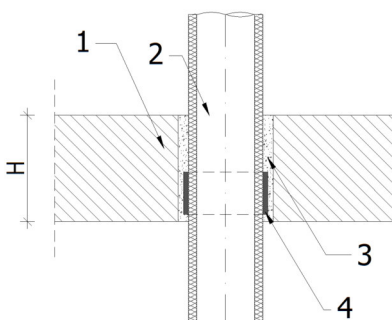
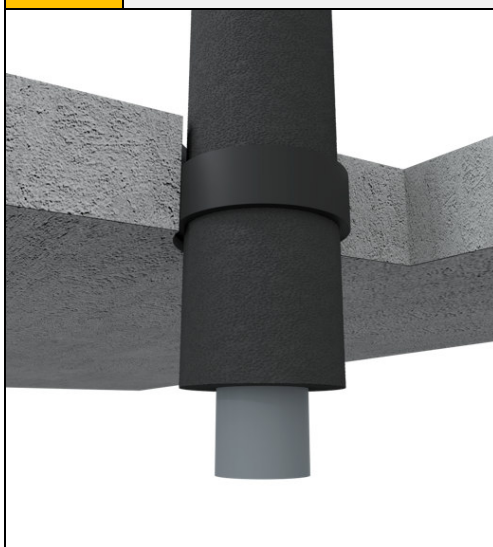
Metal pipe in continuous flammable insulation – in walls



1. Flexible / rigid wall,  $A \geq 125$  mm
2. Metal pipe with insulation
3. Gap filling with cement mortar or **INTU FR MASTIC** mass
4. **INTU FR WRAP L** tape, double row, on both sides of the partition, flush with its edge

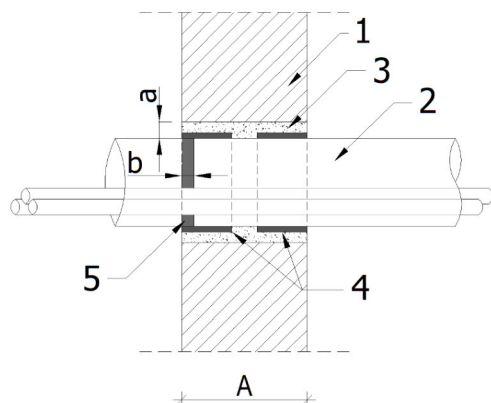
**Fig.9**

Metal pipe in continuous flammable insulation – in floor



5. Rigid floor,  $H \geq 150$  mm
6. Combustible pipe in PE / FEF insulation
7. Gap filled with cement mortar or **INTU FR MASTIC** mass
8. **INTU FR WRAP L** tape, one row, maximum 10 mm from the bottom of the floor

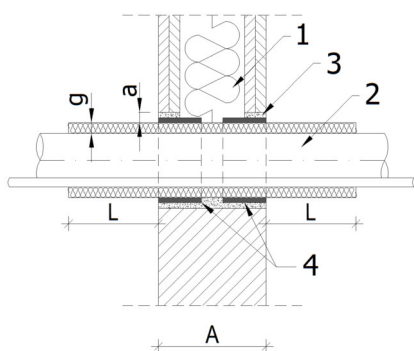
**Fig.11** AROT pipe penetration seals with / without cables in rigid wall with thickness  $A \geq 150$  mm



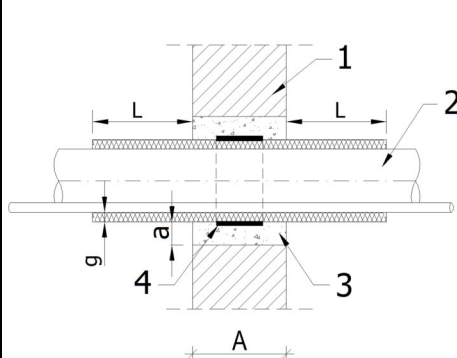
1. Rigid wall with thickness of:  $A \geq 150$  mm.
2. Combustible pipe.
3. Gap filled with cement mortar, ring with max. width:  $a = 50$  mm, on the whole depth of the partition.
4. **INTU FR WRAP L** band (double – placed on both sides, flush with the wall surface).
5. **INTU FR MASTIC** sealant on one side of the wall, depth of:  $b \geq 15$  mm.

Non-combustible pipes with/without heating cable in local sustained insulation (case LS) seals with single/double rows of band

**Fig.12** Flexible / rigid wall  $A \geq 125$  mm double rows



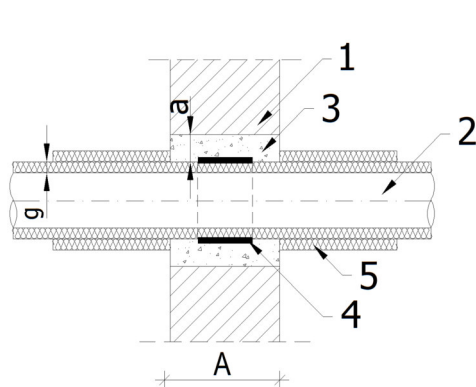
**Fig.13** Rigid wall  $A \geq 150$  mm single row



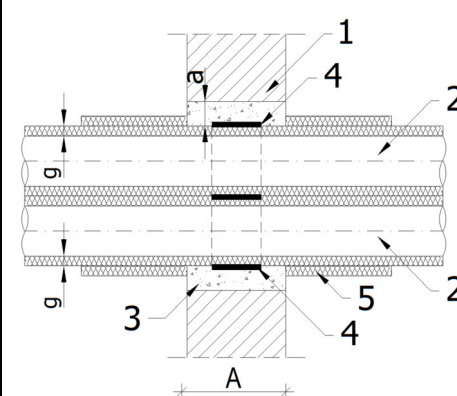
1. Flexible or rigid wall.
2. Metal pipe with/without heating cable in local sustained insulation.
3. Gap filled with cement mortar:  
-for flexible walls cement mortar ring with max. width:  $a = 25$  mm, on the minimum depth: 25 mm on both sides of the wall / for rigid walls cement mortar ring with max. width:  $a = 110$  mm, on the whole depth of the wall.
4. **INTU FR WRAP L** band:  
-single row placed in the wall thickness center  
-double rows placed on both sides, flush with the wall surface.

Additional mineral wool lamella

**Fig.14** Rigid wall  $A \geq 150$  mm



**Fig.15** Rigid wall  $A \geq 150$  mm



1. Rigid wall  $A \geq 150$  mm.
2. Maximum in one bundle:  
2 x metal pipe with insulation,  
1 x plastic pipe and 1 x cable.
3. Gap filled with cement mortar.
4. **INTU FR WRAP L** band. For floor:  
single – placed on the bottom side, max. 10 mm from the floor bottom surface. Wall: double - placed on both sides, flush with the wall surface.