



BRANDSCHUTZSYSTEME

BIM-planning of fire penetration seals with the Rudolf Hensel Product Selector

Process description and operating instructions

October 2022

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A. BIM-planning of fire penetration seals

Building Information Modeling (BIM) describes a working method of networked planning, execution and management of buildings and other structures with the help of software. In the process, all relevant building data is digitally modeled, combined and recorded.

The aim of this method is not only to boost the digital transformation of the construction industry, but also to significantly reduce the costs of construction projects by enabling people, processes and tools to work together in a goal-oriented manner over the entire life cycle of a building. In this way, a construction project gains transparency and reliability of quality, quantity, cost and schedule.

We at Hensel are also convinced of this and therefore support innovative and forward-looking BIM projects by providing BIM objects and support for our fire penetration seal systems. In conjunction with the Rudolf Hensel Product Selector, this allows easy and quick identification of suitable product systems, to check conformity with the technical assessment documents and hence to increase planning reliability. As a member of buildingSMART, we want to help shape the digital transformation of the construction industry and promote the use of BIM in construction projects as a reliable partner in an interdisciplinary competence network. As an industry partner of the buildingSMART German chapter specialist groups "Fire Protection" and "Steel Construction", we are developing open, manufacturer-neutral standards for digital planning, construction and operation using BIM, as well as suitable internal and customer-centric processes for the general use of BIM objects for fire penetration seals in BIM projects.

However, as of today, the late or lacking integration of the planning of fire penetration seals in the construction process can be identified as a current area of tension and causal factor for the frequently inadequate execution of passive fire protection building elements.

The late execution of the fire penetration seals according to the official scale of fees for services by architects and engineers (LP 8 according to German HOAI) almost always coincides with the feasibility study. At this point, however, not only have the technical plans already been completed, but in most cases the installations have already been partially or even completely installed. In the case of inadequate planning, the only way to ensure that the installation of a fire penetration seal system complies with its technical approval document, especially regarding min. required spacing and max. occupancy of openings, is to carry out costly conversions or special solutions.

Much sooner than in LP 8, in which the problem of passive structural fire protection often comes into focus for the first time, the fire penetration seal planning must therefore be integrated into the planning phase (LP 3 to 4), at the latest into the execution planning. The complete information required to make a reliable statement on the conformity of the planned fire penetration seal, however, is usually not yet available in these phases. The corresponding set of rules to observe is complex and a challenge even for experts. Minimum spacing inside and to fire penetration seals must be considered, design requirements for the construction element where the fire penetration seal will be placed, and even the brand names pipes and cables types that may be sealed off are exactly specified.

In the European economic area, all these rules for fire penetration seal systems are summarized in a European Technical Assessment (ETA) in a standardized manner. In Germany, this technical assessment is additionally flanked by the general building approval (abZ) and the general type approval (aBG) or, in Switzerland for example, by the approval of the Association of Cantonal Fire Insurers (VKF).

Therefore, Hensel's aim is to enable the MEP and specialist planners to quickly and independently carry out a search for suitable fire penetration seal systems for a given combination of construction elements and MEP lines, and also to easily document and use identified solutions in BIM models.

With this document, we would like to outline a possible BIM workflow using our *Product Selector*. It is, however, a work in progress. Please feel free to comment and help us understand your requirements.

For the planning of openings based on IFC standards and corresponding workflows, a large number of proposals and guides is already available, especially Autodesk® Revit, proposed for example by buildingSMART chapters or the Revit User Group DACH. Likewise, software that assists in the calculation and placement of openings (so-called provision-for-void or openings managers) for MEP lines is already widely available.

In the following chapters we assume that

- ✓ the required technical assessment document type (ETA or aBG),
- ✓ the required fire resistance period,
- ✓ the construction element in that the fire penetration seal will be installed,
- ✓ the number of conduits to be sealed off respectively if a single, multiple or mixed fire penetration seal is required,
- ✓ and the type of the conduits and media, e.g. cables, combustible or non-combustible pipes,

are at least known, and planning certainty is now to be established with regard to suitable fire penetration seal systems that may be implemented in compliance with their technical assessment document.

This does not exclude that the selection of a product system may have repercussions on the MEP and result in changes to the openings planning, e.g. with regard to the distances to be observed, the selection of insulation material or the distance of the first support hangers.

For an identified and configured seal solution, the *Rudolf Hensel Product Selector* can subsequently be used to generate an individual BIM object with object geometry in the form of an Autodesk® Revit family. Such BIM objects are automatically linked with the configuration settings in the *Product Selector* via a unique ID and parameterized accordingly. However, the planning and documentation of a product solution may also be done without placing a configured BIM object for the fire penetration seal system in the CAD system or BIM model. Both ways are described on the following pages.

If you have any questions regarding the outlined workflow for the BIM planning of fire penetration seals with the *Rudolf Hensel Product Selector*, our product systems or the product search and BIM configuration, please do not hesitate to contact us.

FIRE PROTECTION — OUR PASSION

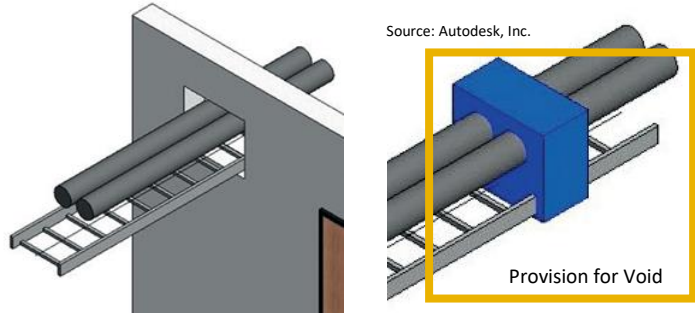
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B. Identification and configuration of a suitable fire penetration seal system

1. For a start, let us assume that walls and ceilings are planned in the architectural model and the fire protection requirements for these structural elements are also determined on the basis of the building class and fire compartments. Subsequently, the specialist planner draws cable routes in a MEP model (or several dedicated models) and identifies required openings for penetrations by means of a collision check with the architectural model.

2. The MEP planners then consider and place required openings (provision-for-void, PfV), which are dimensioned and placed on the basis of experience and empirical values for distances and combinations of MEP elements and spacing of conduits.



At this point, the level of detail (LOD) of the planning is still very low, so that although media in lines may be known, the conduits, e.g. pipes, are not yet conclusively specified in terms of material, brand, diameter, wall thickness, insulation material and other criteria. Single cables, their types and dimensions are commonly not modelled at all, especially in Autodesk® Revit. Without these attributes, however – not to mention the exact notation and syntax for the attribution of the components involved – fully automated identification and testing of approval conformity of suitable fire penetration seal systems is not possible.

3. At this point, in order to increase the planning accuracy, planners can use the online *Rudolf Hensel Product Selector* to identify solutions for the required fire penetration seals. The *Product Selector* is a free tool for architects, MEP planning engineers, fire protection specialists, general contractors or fabricators in the field of passive structural fire protection. It allows quick and easy search of general type approvals (aBG) and European Technical Assessments (ETA) for all product systems for fire penetration seals made by Hensel suitable for a particular installation situation specified by the user.
4. To proceed, please open the link <https://productselector.de>. You may want to switch the language of the user interface via the last entry in the menu on the left side of the screen. Next, please register as a user. The use of the *Rudolf Hensel Product Selector* is completely free of charge and you may try out the product search without registration, however, the registration is necessary for creation of projects and saving a fire penetration seal configuration, as well as the generation of BIM objects.
5. Instructions for use and a video can be found in the menu under "Contact & Help".
6. After registration, start the "Product Selector" search query from the menu on the left.
7. Next, identify and configure a suitable product system for a fire penetration seal: Specify the required technical assessment or country of the construction project (ETA for Europe or aBG for Germany), the minimum required fire resistance period, the construction element that is penetrated, the seal design (single, multiple/mixed penetrations or one-sided pattressed seal) and conduit types to be sealed off, then select a suitable product system.

In the example below, e.g. Europe (ETA), 60 minutes, rigid wall, mixed seal und four different conduit types, three suitable product systems with different design characteristics are found:

8. After selecting a product system, all tested conduits that meet your specification and whose classification is equal to or better than the fire resistance period you required, are listed in two tables. The upper table for pipes and the lower for electrical installations, which can be individually filtered by conduit type using the quick-filter buttons or by a full-text search:

Durchführung	Anzahl	Durchmesser [mm]	Wanddicke [mm]	Isolierung	Isolierdicke [mm]	Isolierlänge [mm]	Produkt (Stück x Lagen)	FWK	Verweis ETA/aBG
Rohr Kupfer/Stahl		≤ 15,0	1,0-14,2	R 800 / RS 800	20,0	CS	HENSOMASTIK® 5 KS SP (Spachtel)	EI 90 U/C	A.1.10.1
Rohr Kupfer/Stahl		≤ 15,0	1,0-7,0	R 800 / RS 800	19,0	LI 2 x 1000	HENSOMASTIK® 5 KS SP (Spachtel)	EI 120 U/C	A.1.10.2
Rohr Kupfer/Stahl		≤ 15,0	1,0-14,2	ArmaFlex Ultima	13,0-25,0	CS	HENSOTHERM® 7 KS Gewebe 125 (2 x 2)	EI 120 U/C	A.1.13.2
Rohr Kupfer/Stahl		≤ 15,0	1,0-14,2	ArmaFlex Ultima	13,0-25,0	LS 1000	HENSOTHERM® 7 KS Gewebe 125 (2 x 2)	EI 120 U/C	A.1.13.2

Durchführung	Anzahl	Max. Durchmesser Bündel [mm]	Max. Durchmesser EIR/ Microtube [mm]	Max. Durchmesser Einzelleitung [mm]	Produkt (Stück x Lagen)	FWK	Verweis ETA/aBG
EIR/Flexrohre (Bündel, mit Kabel)		≤ 125,0	≤ 50,0	≤ 21,0	RORCOL V60 (2)	EI 90	A.1.6.13
EIR/Flexrohre (Bündel, ohne Kabel)		≤ 125,0	≤ 50,0		RORCOL V60 (2)	EI 90	A.1.6.13
EIR/Flexrohre (Einzelleitung, mit Kabel)			≤ 50,0	≤ 21,0	RORCOL V60 (2)	EI 90	A.1.6.2
EIR/Flexrohre (Einzelleitung, ohne Kabel)			≤ 50,0		RORCOL V60 (2)	EI 90	A.1.6.2

9. Use the "Seal size and feasibility check" section below the tables to specify the shape and size of the opening:

10. Then select conduits to be sealed off and, if necessary, increase the number of multiple identical conduits using the +/- buttons (only visible after selecting a row in a table). When done, for a

better overview, all other lines in the table can be hidden with the "Show only selection" button that is now visible.

Europa (ETA)

90 Minuten

Massivdecke

Kombischott

Medienauswahl

HENSOMASTIK® Kombischott EI90/EI120 | ETA 20-1309

Optionen

Rohre

Volltextsuche

Nur Auswahl zeigen (4)

Rohre brennbar 2

Rohre nichtbrennbar

Mehrschichtrohre 2

Durchführung	Anzahl	Durchmesser [mm]	Wanddicke [mm]	Isolierung	Isolierdicke [mm]	Isolierlänge [mm]	Produkt (Stück x Lagen)	FWK	Verweis ETA/aBG
Friaphon	2x	110,0	5,3				AWM II (1)	EI 90 U/U	A.2.3.1
Geberit Mepla Systemrohr ML	2x	63,0	4,5	AF/ArmaFlex	14,0-40,5	CS	7 KS Gewebe 50 (2 x 2)	EI 120 U/C	A.2.10.1

Kabel

Volltextsuche

Nur Auswahl zeigen (1)

Einzelkabel

Kabelbündel

Kabeltrasse

EIR/Flexrohre 1

Durchführung	Anzahl	Max. Durchmesser Bündel [mm]	Max. Durchmesser EIR/ Microtube [mm]	Max. Durchmesser Einzelleitung [mm]	Produkt (Stück x Lagen)	FWK	Verweis ETA/aBG
EIR/Flexrohre (Bündel, mit Kabel)	1x	≤ 125,0	≤ 50,0	≤ 21,0	RORCOL V60 (1)	EI 120	A.3.4.2

Produktlösung speichern

11. For product systems that allow multiple and mixed conduits to be sealed off in the same opening, the "Seal size and feasibility check" section below the tables will show the occupied fire penetration seal area and remaining reserves for post-installations based on your selection.

Schottgröße und Belegungsplanung

B 500 mm x H 500 mm

Aktuell sind 21 % belegt, maximal 60 %

Form des Durchbruchs:

Schottfläche: Breite 500 mm x Höhe 500 mm

Belegbare Schottfläche bei diesem Produktsystem:

Aktuell belegt (max. Leitungsdurchmesser und Isolierung):

Reserve für Nachbelegung:

=

60 %

21 %

39 %

Eckig

250.000 mm²

150.000 mm²

54.781 mm²

95.219 mm²

Schottgröße ändern

Ohne Berücksichtigung der einzuhaltenden Abstandsvorschriften im Schott ist eine Installation wahrscheinlich möglich.

Attention! The purpose of the occupancy calculator is to remind users that the usable seal area may differ from its total area and that post-installations, especially of cables, are common in practice. Please note that the occupancy will always be calculated on the basis of the maximum permissible cable or pipe cross-sections and the maximum permissible insulation thickness. The required minimum spacing of conduits in the seal to each other and to the reveals is not taken into account!

12. Finally, check the provisions for planning, dimensioning and execution of the product system at the bottom of the screen and save the configured product solution and assign it to a project.

Produktlösung speichern

Bestimmungen für Planung, Bemessung und Ausführung

1. Zugelassene Konstruktionselemente:

Die spezifischen Konstruktionselemente, für die das HENSOMASTIK® Kombischott EI90/EI120 zur Abschottung verwendet werden kann, sind:

a. Leichtbauwände:

Die Wand muss eine Mindeststärke von 100 mm aufweisen und bestehen aus einem Holz- oder Stahlständerwerk, das auf beiden Seiten mit mindestens zwei Lagen aus 12,5 mm starken Platten verkleidet ist. Zwischen der Abschottung und den Stützen muss ein Mindestabstand von 100 mm eingehalten werden und der Spalt zwischen Stütze und Abschottung muss mit mindestens 100 mm Isoliermaterial der Klasse A1 oder A2 gemäß EN 13501-1 verschlossen werden.

b. Massivbauwände:

Die Wand muss eine Mindeststärke von 100 mm aufweisen und aus Beton, Porenbeton oder Mauerwerk mit einer Mindestdichte von 650 kg/m³ bestehen.

c. Massivdecken:

Die Decke muss eine Mindeststärke von 150 mm aufweisen und aus Porenbeton oder Beton mit einer Mindestdichte von 650 kg/m³ bestehen.

Die Tragkonstruktion muss in Übereinstimmung mit der EN 13501-2 für die erforderliche Feuerwiderstandsdauer eingestuft sein.

2. Maximale Schottgröße:

BIM-planning of fire penetration seals – Rudolf Hensel GmbH – 10/2022

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C. Use of configured fire penetration seal systems in a BIM model

1. In the "Projects" area, that can be accessed via the menu on the left after login, the configured product solution was assigned to a construction project and a construction phase. Various options are available here:

The screenshot displays a web-based interface for managing fire penetration seal systems in a BIM model. The interface is organized into several sections, each with specific functionality highlighted by yellow callout boxes:

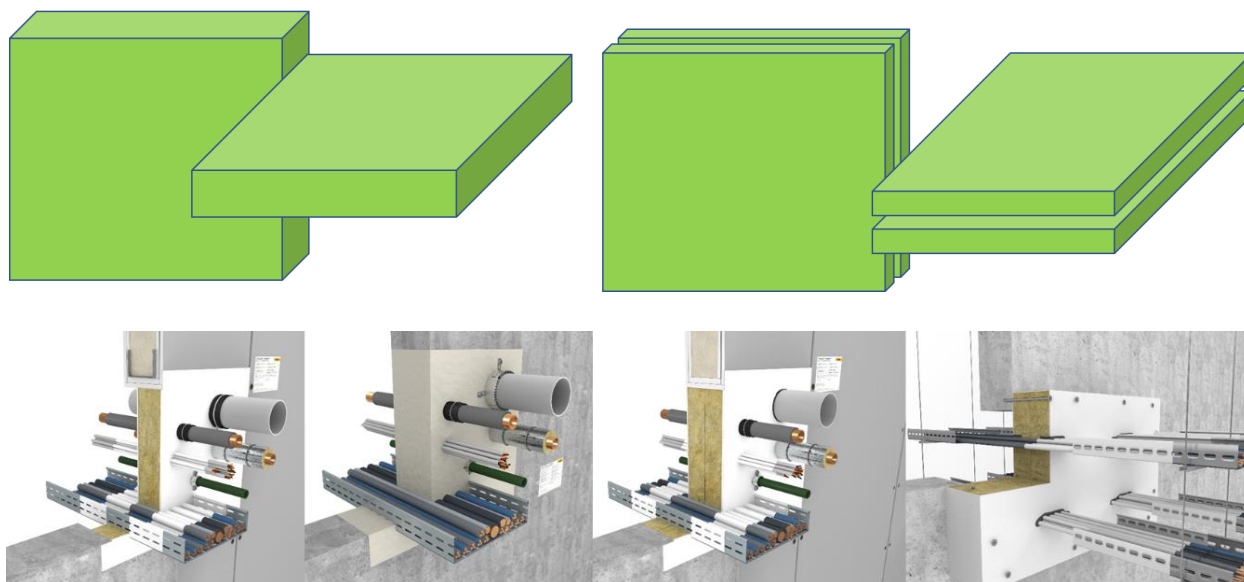
- Top Bar:** Includes an "Options" menu (three dots) and a button to "Create a PDF showing all project details, archive or delete projects."
- Project Header:** Displays "Rudolf Hensel Demo 1, Testgebäude" with the address "Teststr. 1, 12345 Testhausen, Germany". A callout explains: "Edit project details (name, address, contact person, client etc.) and show construction phases and assigned product solutions via the submenu on the left side."
- Construction Phase:** Shows "New construction phase + Hilfe R". A dropdown menu for "Bauabschnitt 1" (Keller) is shown. A callout states: "Edit, delete or copy construction section and add more product solutions using the product selector."
- Seal Entries:** A list of configured seals is shown, each with a unique ID and a status icon (green checkmark or red warning triangle).
 - BIM Test 1:** HENSOMASTIK® Kombischott EI90/EI120 | Europe (ETA) | 60 minutes | Rigid wall | Mixed / multiple penetration seal | 1. Conduit: 500 x 500 mm | XU5VEC8W | 1%. Callout: "Edit conduit types and numbers in the seal, change size and shape of the opening."
 - Keller, Wand Raum A/B:** HENSOMASTIK® Kombischott EI60 | Europe (ETA) | 60 minutes | Rigid wall | Mixed / multiple penetration seal | 5. Conduit: 600 x 400 mm | XU5VEC8W | 1%. Callout: "Shape and size of the fire penetration seal."
 - Keller, Wand Raum A/B:** HENSOMASTIK® Kombischott EI60 | Europe (ETA) | 60 minutes | Rigid wall | Mixed / multiple penetration seal | 5. Conduit: 100 x 100 mm | G2YD9S8X | 868%. Callout: "Occupancy calculator recommends to adjust opening/seal size and check selected conduits."
 - Keller, Wand Raum A/B:** HENSOMASTIK® Kombischott EI60 | Europe (ETA) | 60 minutes | Rigid wall | Mixed / multiple penetration seal | 5. Conduit: YBRW593D. Callout: "Calculated occupancy rate is between 40 % and 60 %, i.e. holds little reserve for post-installations."
 - Keller, Wand Raum A/B:** HENSOMASTIK® Kombischott EI90/EI120 | Europe (ETA) | 60 minutes | Rigid wall | Mixed / multiple penetration seal | 5. Conduit: 300 x 300 mm | WBQ57GCA | 41%. Callout: "Create Autodesk Revit BIM family for bulkhead solution. This is not possible if seal dimensions are missing."
 - Test BIM 2-Platten Decke:** HENSOMASTIK® EI90 2 x 500 mm | Germany (aBG) | 60 minutes | Rigid wall | Mixed / multiple penetration seal | 5. Conduit: 500 x 800 mm | S8PYWZEX | 13%. Callout: "UniqueID of the fire penetration seal"
 - Test 2x Quader BIM (Feldname: Bezeichnung):** HENSOMASTIK® Kombischott EI90/EI120 | Europe (ETA) | 60 minutes | Rigid wall | Mixed / multiple penetration seal | 3. Conduit: 500 x 400 mm | VGBD78SK | 13%. Callout: "Brief description available"
 - Test BIM Decke:** HENSOTHERM® 17 KS Gewebe 30 | Germany (aBG) | 60 minutes | Rigid floor | Single penetration seal | 1. Conduit: x 120 mm | 3YF57EWQ. Callout: "Indicator that personal notes are existing."

A large callout box at the bottom right explains the 3-dot menu options:

- Use 3-dot-menu to:
 - Edit seal description, name and notes,
 - Edit conduits in the seal,
 - Copy seal configuration into a new entry,
 - Create PDF for construction details,
 - Create PDF for seal configuration, or
 - Delete the product solution.

- When saved, each product solution is assigned a UniqueID generated by the *Product Selector*. In case you do not want to work with BIM objects generated by the *Product Selector*, the UniqueID of the seal may instead be copied to the respective provision for void to link the configuration and maintain a BIM model without manufacturer information. If necessary, further web links, planning information and attributes may also be added. Via the options menu of the project in the top right corner, a PDF may be created to show a list of all configured product solutions and their UniqueIDs.
- For BIM modeling with Autodesk® Revit, a Revit family (.rfa file) for the configured product system can be created via the  icon. The *Product Selector* will create one of six basic geometric shapes for positioning in walls and floors according to the specified opening size and construction element. These can be placed in the existing provision for voids, allowing to keep them and any information linked to them (usually, at this point in the design process, MEP planners and architects have created a long and important history of comments from the coordination process).

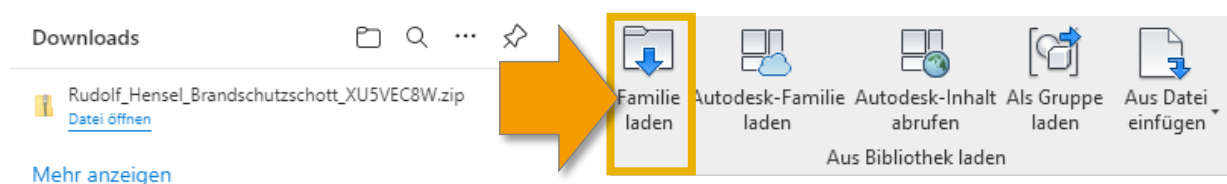
Cuboids for multiple and mixed penetration product systems with one or two layers of e.g. mortar or mineral fibre boards placed in larger openings:



Cylinders for single penetration product systems usually used to seal core-drilled openings:



- With a click on the  icon, the *Product Selector* creates a ZIP folder containing the RFA file and a TXT configuration file, that contains information about the product system, the seal shape and size, penetrating conduits, and the UniqueID etc.

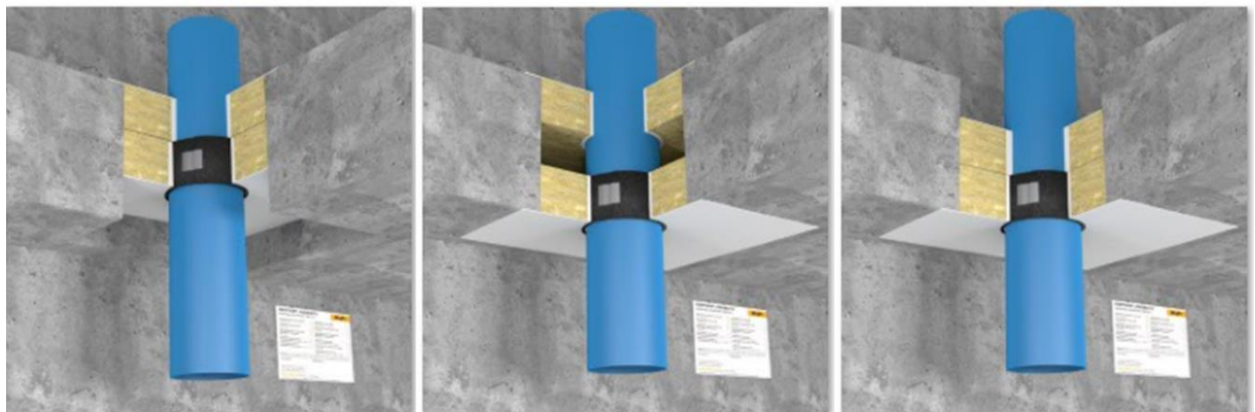


Attention! When importing to Revit, the RFA and the TXT file must be located together in the same folder to ensure that the configuration and parameterization is correctly applied! For this, the correct configuration file must be selected (line turns black) and confirmed with "OK".

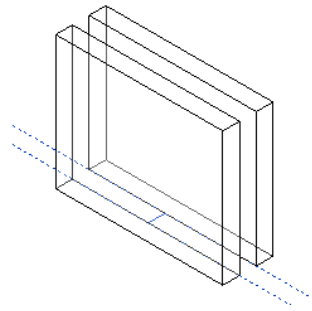
Familie	Typ	Width	System	Shape	ProductionYear	ModelReference	ModellLabel	Manufacturer	IfcExportType	IfcExportAs	Height	Gap	FireRating	Depth
Rudolf_Hensel_Brandschutz	HENSOMASTIK Kombischott E90/E120, VGBD78SK	500.0	Rohre brennbar	Rectangle	2022.07.14.13.13	VGBD78SK	HENSOMASTIK	Rudolf Hensel G	PROVISIONFOR	IfcBuildingElem	400.0	0.0	90	50.0

- Imported families appear, possibly after a model update to the Revit version used, in the "General Model" and grouped in the category "Rudolf Hensel" showing their UniqueID.

- The information for height and width of the opening respectively seal has already been transferred to the object by the *Product Selector* together with the product system and the installation location (horizontal or vertical orientation). However, you will need to adapt the seal thickness to the construction element. Due to the possible installation variants of fire penetration seal systems comprising two mineral fibre boards that may be placed with or without spacing, the two cuboids of these families can be positioned individually.



7. Further, the thickness of e.g. the mineral fibre boards in a HENSOMASTIK® soft seal system or the thickness of a HENSOTHERM® M 2000 mortar system is initially set to the minimum requirement for each product system. The dimensions can be individually adjusted using the parameters "Depth 1", plus "Depth 2" and "Gap" for product systems with two mineral fibre boards.



Text	
IfcExportAs	IfcBuildingElement
IfcExportType	PROVISIONFORVC
Abmessungen	
Depth	150.0
Depth 1	50.0
Depth 2	50.0
Gap	50.0
Height	400.0
Shape	RECTANGLE
Width	500.0
ID-Daten	
Typenbild	

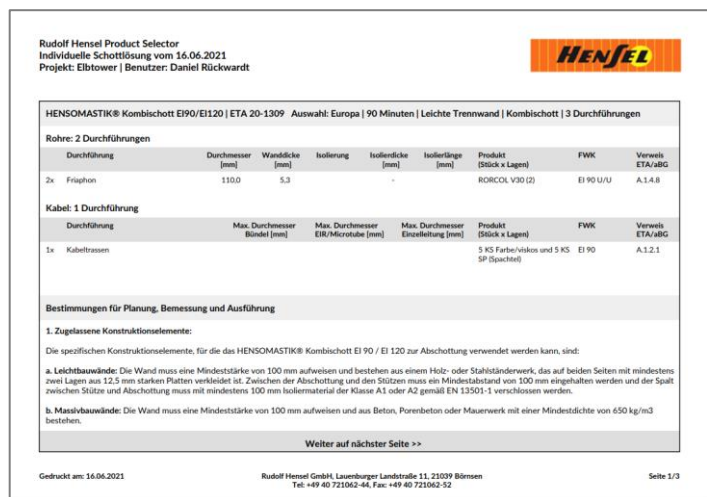
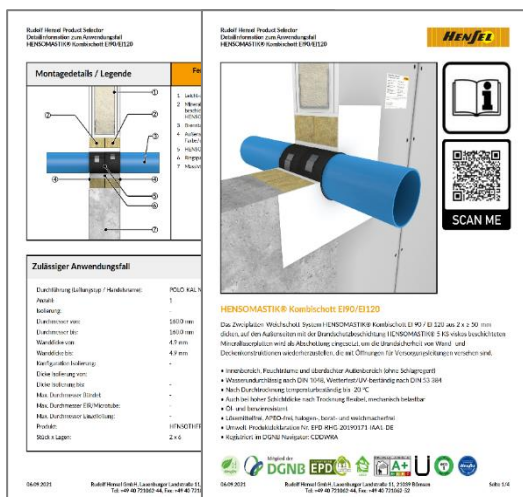
8. It often happens that identical openings and fire penetration seals are planned in a BIM model for pipe and cable paths within one floor or above floor levels. With identical requirements, supporting structures, dimensions and conduits in the seal, the Revit family of the product system may be copied and used for several openings. In this case, Revit will assign a new object ID and the UniqueID of the seal assigned by the *Product Selector* remains the same. Likewise, all dimensions are taken over 1:1, even if they have been adapted.

However, as soon as a planning parameter changes, e.g. the number or type of penetrating conduits or the seal size, a new BIM object must be configured and created via the *Product Selector* to ensure conformity with the technical approval document and to keep track of the configuration and documentation accordingly.

Also, you may of course use the Revit families for the product systems without UniqueIDs.

D. Documentation of fire penetration seal systems

1. Several PDF printing options for seal configuration and individual construction details are available from the options menu of configured product solutions, making documentation easier.



2. The technical documentation of the product systems is updated regularly and can change over time, possibly even between the planning and construction phase. Therefore, the QR code on the first page of the construction details PDF will always lead to the latest documentation available on the internet, including the manufacturer's declaration of performance, the safety data sheet and the assembly instructions of the product.

Also, the web links stored in the BIM objects of our product systems are valid indefinitely and always lead to the latest product documentation.




HENSOMASTIK® Kombischott EI 90 / EI 120

HENSOMASTIK® Kombischott-Systeme werden als Abschottungen für Metallrohre, brennbare Rohre und elektrische Leitungen eingesetzt, um die Brandsicherheit von Wand- und Deckenkonstruktionen wiederherzustellen, die mit Öffnungen für Versorgungsleitungen versehen sind.

Beim HENSOMASTIK® Kombischott EI 90 / EI 120 handelt es sich um ein System, das aus 2x ≥ 50 mm dicken und auf den Außenseiten mit der Brandschutzbeschichtung HENSOMASTIK® 5 KS viskos beschichteten Mineralfaserplatten besteht.




Kombischott in einer Massivdecke EI 90 Kombischott in einer Leichtbauwand EI 90

Produktmerkmale des Beschichtungsproduktes HENSOMASTIK® 5 KS Farbe / viskos

- Lösemittelfrei, APEO-frei, halogen-, borat- und weichmacherfrei
- Wasserundurchlässig nach DIN 1048
- Öl- und benzinresistent

Downloads

[Bewertung
ETA 20/1309](#)

[Montagehandbuch](#)

[Leistungserklärung](#)

[Übereinstimmungserklärung](#)

[Updates erhalten](#)

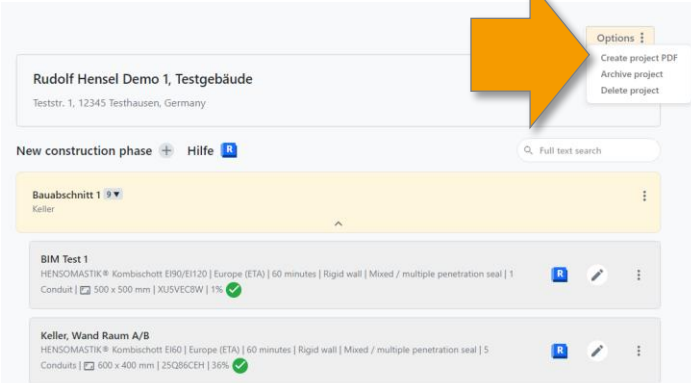
[Ausschreibungstexte](#)

Ansprechpartner

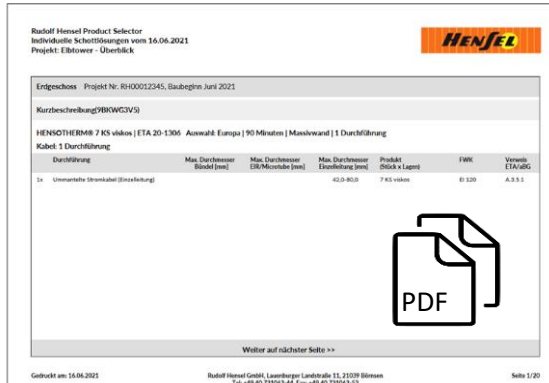
Vertrieb D/A/CH
Tel: +49 40 721062-44
Fax: +49 40 721062-52
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[Feedback geben](#)

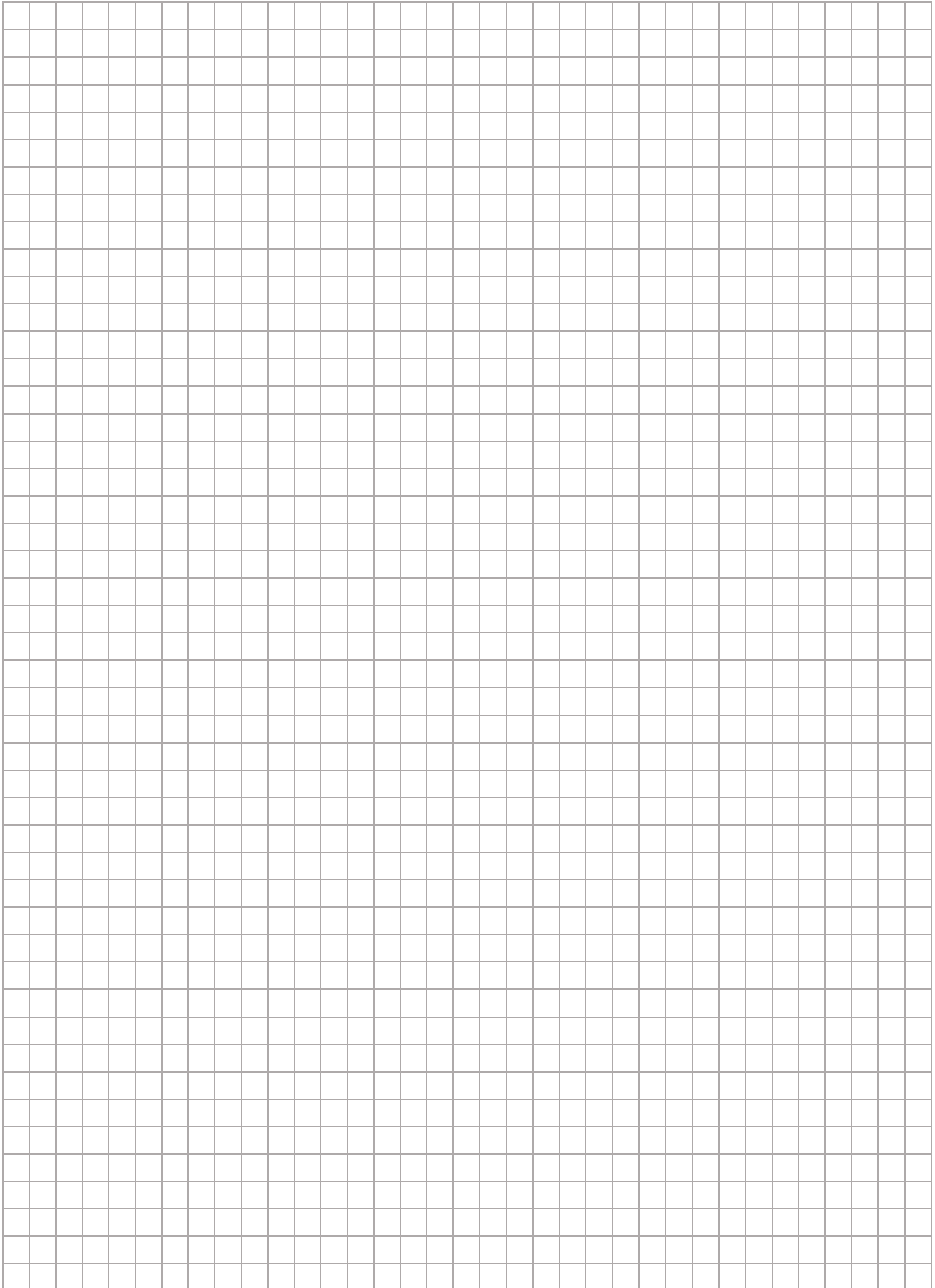
3. A PDF for the complete overview of all product systems used in a construction project, including their UniqueIDs, penetrating conduits and reference to the corresponding chapter in the technical assessment document can be created via the project menu.







4. Please remember that in the event of changes to penetrating conduits, construction elements and/or openings (size, shape), it must be ensured that the relevant product solution is adapted in the "Projects" area. Use 3-dot-menu of a saved product solution to edit description, name and notes, conduits in the seal, conduit types and numbers.
5. In case you should have saved PDF documents in the BIM model, make sure that these are updated.



In case of any questions please contact our technical support team!

For full product documentation and other information to download please visit our website www.rudolf-hensel.de

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