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1 GENERAL

1.1 isoplus - The Company

1.1.1 Preface 6th Edition

The 5th edition of the **isoplus** design manual, established in April 2005, was an essential step in more than thirty-five years history of **isoplus** group of companies, in order to comply with the increased requirements of energy supply.

Within six years the total edition of approx. 10.000 pieces were sold out. Due to product developments, technical innovation and permanent change of market requirements, this new and completed 6th edition was necessary.

This 6th edition is also available under **www.isoplus.org** where it will be permanently updated and offered for download.

We want to thank everybody who helped us to create this 6th edition. All technical, informative and general important proposals for completion have been considered. The structure of chapters has been revised in general.

In this regard, we refer especially to chapter

>> 2 - Rigid Compound Systems

and especially to **isoplus**-Conti-Pipe System. In this chapter you will find also the complete product range of **isoplus**-Double Pipe System, including the corresponding application and assembling instructions.

isoplus is a member of German Association of District Heating e. V., **AGFW** and of the German Federation of District Heating Pipes e. V., **BFW**.

All **isoplus** production plants are certified according to DIN EN ISO 9001 and DIN EN ISO 14001, - Your **plus** of safety.

Besides of this design manual all **isoplus**-production plants, all sales partners and external sales people will be at your disposal. Furthermore you may contact directly our district heating engineers at the several design departments of our companies.

Your general management of the **isoplus** group of companies.



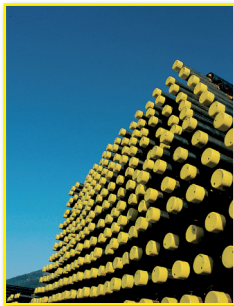
AGFW



EUROHEAT & POWER



1.1.2 The Group

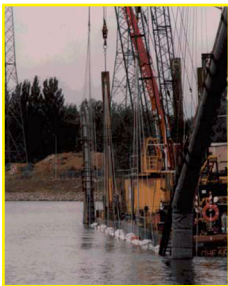


The **isoplus** group of companies consists of several legal independent production and distribution companies, who are acting all over Europe. However **isoplus** stands for more than just a name. It is the idea to offer a complete production range for our customers, that means delivery of the material incl. all required assembling and post insulation work, carried out by **isoplus** assembly-technicians.

This company-philosophy „all from one hand“ in connection with **isoplus**-quality, innovative products and **isoplus** delivery-confidence leads the company **isoplus** through more than 35 years impressive success and to an important position on international markets.

As manufacturer of preinsulated pipe systems for the supply of energy and for all kind of industrial applications, we are producing in our international factories with totally 1.200 employees, preinsulated pipes and fittings conventionally as well as continuously by using high technology equipment. Our additional regional offices will guarantee for an optimum of local service.

The **isoplus** group of companies is delivering approx. 3.000 km of pipes per year, world-wide, in dimensions of DN 20 up to DN 1000 mm. As a qualified group of companies, the products of our sub-suppliers as well as our finished products have to pass very strong quality control procedures by external and internal quality-engineers. Therefore our products correspond to the requirements of the European Standards as well as to all other valid technical regulations in all respects.



Preinsulated district heating pipelines with PEHD jacket pipe can be used for direct channel free buried-laying. By use of various fittings and compensating elements a perfect system comes into being which is flexible enough even in difficult conditions, i. e. in city-centres, unusual terrain or in case of subterranean passing of rivers. Traffic-interruptions can be reduced to a minimum in accordance with the construction companies, due to short assembly times.

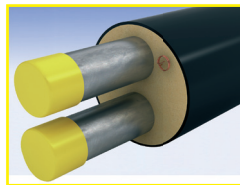
The **isoplus**-simplex-pipe, with PEHD-jacket pipe or SPIRO-jacket pipe, has been practically proved during many years, not only by technical perfection, but mainly by economical aspects concerning purchase, assembling and maintenance.

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1.1 isoplus - The Company

The most innovative and most economic variant of the preinsulated pipe-systems is the development of the **isoplus-double-pipe**. By use of a PEHD jacket pipe, essential savings can be reached concerning heat loss, constructing and assembling expenses, quantities of shrinkable couplers and expansion pads, and for leak detection.

The **isoplus-double-pipe**, energy saving marvel, unique in economy and ecology, produced in conventional and also by continuous production procedure.



All rigid simplex- or double-pipe-systems are additionally selfcontrolled by **IPS-Cu** or **IPS-NiCr** on every cm of the pipe-line lengths. The foamed in leak detecting control wires will indicate each moisture penetration and each wire breakage within the network.

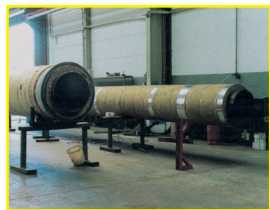


Additionally to rigid-pipe-systems **isoplus** is producing flexible-pipe-systems as well, which are especially used for house connections. Coiled down, **isoplus-flexible-pipes** can by-pass obstacles without any problems. Carrier pipes made of steel, copper, PEX or PE are available.

For the production of **isoplus**-simplex, duplex- and flex-pipes, the excellent insulating PUR-rigid foam will be used. The absolute moisture protection due to the shock-resistant and break-proof PEHD-jacket guarantees a high degree of reliability for many years.

The different laying techniques for **isoplus** pipe systems like thermal pre-stressing, cold laying as well as tapping-branches reduce the laying costs considerably because natural compensation elements such as L-, Z- or U-bends are not necessary. The same applies for the underground working as only for couplers and expansion pads larger areas have to be provided.

Pipe line systems exposed to extremely high temperatures and pressures put high demands to material and manufacturing. The dimensioning of **isobrigg-steel jacket-pipes** applies to the extreme conditions for the distribution of hot water or steam and thus guarantees a high degree of safety. The outside steel jacket pipe is a closed system, water-proof and gas-proof. A standard PE covering serves as corrosion protection. For heat insulation mineral or rock wool fibre shells are used.

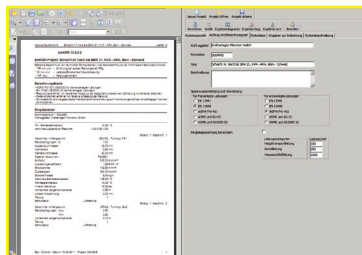
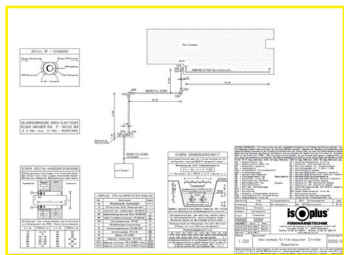




All **isoplus**-products might be used for different applications such as heating, sanitary, steam, cooling pipes, oil, chemical and foodstuff industry etc. and temperatures at least according to EN 253. Perfect welding engineering within the steel and PE area guarantee solid products with the necessary operational reliability.

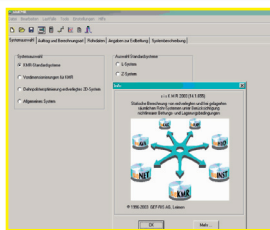
Individual design leads to optimised district heating networks and guarantees an economic and ecological solution for working and operation steps. Show us your problem, we will show you the solution.

The fabrication in our production plants as well as the quality assurance and the documentation applies to the European quality standard **DIN EN ISO 9001**. In addition to our products we offer a wide and complete range of services. A qualified consulting during all steps of your projects given by our certified chief engineers, mechanical engineers as well as by our regional sales engineers guarantee the perfect installation of **isoplus**-products.



In addition, our construction department guarantees the necessary calculations for pipe static which are documented with the delivery of the routing plan. Specifications and routing modifications are easily documented and thus assure in coordination with the fabrication smooth site works.

The international quality standard of the **isoplus** systems in combination with **isoplus** special products and the use of modern laying techniques results in economic district heating networks and helps to guarantee a trouble-free operation for many years.



1 GENERAL

1.2 isoplus - Your Partner in Europe and Near East

1.2.1 Overview



Headoffice / Sales

GERMANY, Rosenheim



Production / Sales

GERMANY, Sondershausen

AUSTRIA, Hohenberg

HUNGARY, Budapest

CZECH REPUBLIC, Pardubice

ROMANIA, Oradea

SERBIA, Aleksinac

KUWAIT, Safat

ITALY, Villamarzana



Sales

GERMANY, Berlin

DENMARK, Middelfart

SLOVAKIA, Dunajská Streda

POLAND, Kattowitz

CROATIA, Zagreb

SERBIA, Belgrad

SWITZERLAND, Islikon

FRANCE, Grigny

NETHERLANDS, Breda

GREECE, Florina



The **isoplus**-group is additionally represented in various countries.

A list of these countries and the corresponding **isoplus** branch offices you will see on following pages.

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1 GENERAL



1.2 isoplus - Your Partner in Europe and Near East



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The following countries are currently supported by **isoplus** (Edition 01/2012):

Country:	Support:
Austria	isoplus in Austria, Hohenberg
Belgium	isoplus in the Netherlands, Breda
Bosnia-Herzegovina	isoplus in Germany, Rosenheim
Brazil	isoplus in Austria, Hohenberg
Bulgaria	isoplus in Germany, Rosenheim
Croatia	isoplus in Croatia, Zagreb
Czech Republic	isoplus in Czech Republic, Pardubice
Denmark	isoplus in Denmark, Middelfart
Estonia	isoplus in Denmark, Middelfart
Finland	isoplus in Denmark, Middelfart
France	isoplus in France, Grigny
Germany	isoplus in Germany, Rosenheim
Great Britain	isoplus in Denmark, Middelfart
Greece	isoplus in Germany, Rosenheim
Hungary	isoplus in Hungary, Budapest
Iceland	isoplus in Denmark, Middelfart
Ireland	isoplus in Germany, Rosenheim
Italy	isoplus in Italy, Villamarzana
Kazakhstan	isoplus in Germany, Rosenheim
Latvia	isoplus in Germany, Rosenheim
Liechtenstein	isoplus in Switzerland, Islikon
Lithuania	isoplus in Poland, Kattowitz
Luxembourg	isoplus in Netherlands, Breda
Macedonia	isoplus in Germany, Rosenheim
Monaco	isoplus in France, Grigny
Netherlands	isoplus in the Netherlands, Breda
Norway	isoplus in Denmark, Middelfart
Poland	isoplus in Poland, Kattowitz
Portugal	isoplus in Germany, Rosenheim
Romania	isoplus in Romania, Oradea
Russia	isoplus in Germany, Rosenheim
San Marino	isoplus in France, Grigny
Sweden	isoplus in Denmark, Middelfart
Switzerland	isoplus in Switzerland, Islikon
Serbia	isoplus in Serbia, Belgrad
Slovakia	isoplus in Slovakia, Dunajská Streda
Slovenia	isoplus in Austria, Hohenberg
Spain	isoplus in Italy, Villamarzana
Ukraine	isoplus in Germany, Rosenheim
United Arab Emirates	isoplus in Austria, Hohenberg
Other international countries	isoplus in Germany, Rosenheim

1 GENERAL

1.3 isoplus - Your Plus of Safety

1.3.1 Quality-Assurance, Service, Documentation

The total **isoplus**-group considers Quality Assurance as very important. A management system according to **DIN ISO 9001** is implemented in every **isoplus**-production plant, in order to assure continuously a Quality Assurance on the highest technical level. This Quality Management System includes all divisions like production and dispatch, design and project engineering, application as well as post insulation or assembly.

Condition for the realisation of this system within the **isoplus**-group is the systematically organisation of all procedures and their controlling day by day. All single divisions are spreading into each other and are in summary directly in charge of the general management. The general management will inspect periodically the effectiveness of the Quality-Assurance by internal reports, audits, technical and commercial documentation.

Production

The Quality Assurance, respectively Management-System according to DIN EN ISO 9001, implemented in all **isoplus**-production plants is the external acting frame of quality control. Furthermore even higher degree of safety are provided for all system-materials, in order to avoid any insufficiency or defective material caused by site conditions, from the very beginning.

The production of all fittings up to DN 300 mm in high quality is included therein, as well as the general use of steel-medium-pipes in seamless wall thickness up to DN 80 mm. That means that **isoplus** is not only producing according to the European standards EN 253 and EN 448 but will partly exceed it essentially.

Vendor Inspection

isoplus is checking all arriving materials very detailed according to EN 253, before they may be used for production. Small quantities will be analysed in the laboratory. Approved sub-suppliers have to be certified according to the guidelines of DIN EN ISO 9001 and they have to present all required, respectively necessary certificates (APZ).

Intermediate Inspection

Every collaborator of **isoplus** is obliged to check his work according to the valid instructions and within the sense of the company's quality politics, after the end of each working-step. Furthermore test and control procedures documented in the standards and guidelines will be carried out and documented by independent quality assurance authorities during the production procedure, as part of self-controlling.



1.3 isoplus - Your Plus of Safety

The complete Quality Assurance from entry of material until delivery of finished product, will be completely guaranteed by **isoplus**-service applications. Our design engineers will prepare your project technically and economically. Very important is to reach a most possible conformity between the schedule established for the building site and the final requirements of the project owner. Therefore **isoplus** offers the following service:

Design

- Detailed first information for special project requirements
- Investigation of the trench in order to optimise pipe guidance and material
- Creating tenders, material lists and design for offers
- Using of new pipe laying technologies and materials in order to improve economy
- Investigation of the provided materials and preparing of economical alternatives like **isoplus**-flexible-pipes or **isoplus**-double-pipes

Project Work

- Investigation concerning feasibility of requirements
- Establishing of trench design and creating of the required material-list
- Comparison of design-respectively requirements, with building site and production
- Checking of pipe static and approval of pipe laying according to the standards
- Permanent correspondence with owner of the project, consultants and constructing companies

Execution

- Participation at project-discussions after request
- Co-ordinated and short delivery time in order to reach an optimal project realisation
- Building site introduction with **isoplus** collaborators in charge
- Immediate check and approval in case of modifications including new specification
- Short time of production for eventually additional required fittings and accessories

Assembling

- Post insulation work of all connection couplers
- Assembling of expansion pads at all static required areas according to drawings
- Local Polyethylene welding for special jacket pipe parts
- Installation of **IPS**-leak detecting for an optimum of safety
- Self control of all assemblers by QA department

Acceptance

- Record of tightness for connection couplers
- Checking of all expansion pads and PE-welding seams
- Checking of **IPS**-leak-detecting and establishing of measurement record
- Acceptance with project owner or/and purchaser, locally after agreement
- Guaranty for all **isoplus**-products and design works

isoplus will establish on request a technical system-documentation for all delivered materials, as well as corresponding design for pipe trenches and control wires, which may be included into the total project-documentation. Such documentation documents continuous Quality Assurance of the **isoplus**-group and secures safety of the total district heating network, without any complaints for many decades.

The documentation will be delivered in binders. Before the documentation will be established the required extension should be known, because later on it will be not possible to integrate certain chapters. In detail the **isoplus**-documentation includes the following chapters, which may be completed or cancelled as requested case by case.

- General system-, material and operating description of **isoplus**-products
- Technical data and dimensions of materials and products
- Instructions for assembling, storage, construction work and pipe laying, as well as for post-insulation work of **isoplus**-components
- Total required material certificates, works and quality certificates
- **IPS-Cu** or **IPS-NiCr** alarm system and operation instructions, assembling instructions, start of operation and acceptance-record
- **IPS**-measurement records according to actual data, eventually for several sections, determined according to special measurement procedures
- Design of alarm wires of alarm system **IPS-Cu** or **IPS-NiCr** showing all installed system-components as black/white copy or in original (by plotter) or as PLT-file
- Connection couplers records of all post insulation works carried out by **isoplus**-collaborators, certified by AGFW/BFW
- Actual design of **isoplus** pipe-trench after pipe-laying work will be finished, based on a detailed measurement design which should be provided, **no isometrics!** With all required pipe-static details for buried preinsulated jacket pipes compound systems as black/white copy or original (by plotter) or as PLT-file
- Pipe-static calculations as PC-print according to given parameters as well as separated to the pipe-trench-marks, based on pipe-static-guidelines for buried preinsulated jacket pipes

In case that several documentation will be required after a project will be finished, we will work out our performance schedule after request, as this is not included in our original offer. Also parts of technical documentation including a. m. details can be established later on after request.

1 GENERAL

1.3 isoplus - Your Plus of Safety

1.3.2 Who is doing what?

Nr.	Project-Schedule	Project-Owner Purchase	Engineering	Works Construction	Pipe-laying	isoplus
1	Construction design, start of design procedure	X				
2	Customer, respectively user acquisition	X				
3	Calculation of required energy for users		X			
4	Hydraulic network-calculation resp. dimensioning		X			
5	First design		X			
6	Getting approvals from local authorities		X			
7	Measurement of designed trenches in lengths and heights		X			
8	Measurement of existing distributing lines		X			
9	Work out of trench design in lengths and heights		X			
10	Work out of material-list for the project		X			
11	Preparing of tender documents		X			
12	Dispatch of performance-description		X			
13	Price calculation of offer and placing of offer in time			X	X	X
14	Work out of project- time schedule	X	X			
15	Placing of order		X			
16	Visit of building site before start of works	X	X	X	X	X
17	Eventually second common measurement of trench after agreement				X	X
18	Work out of pipe-static calculation of buried pipes					X
19	Demonstration of pipe-static by presenting design for expansion pads					X
20	Material specification of isoplus -pipes, fittings and accessories					X
21	Equipment for building site			X	X	
22	Marking of foreign pipelines along the new trench		X	X	X	
23	Excavation of the pipeline-trench in consideration of standards and UVV			X		
24	Wall penetrations at the houses of the users			X		
25	Delivery of isoplus material					X
26	Unloading and weather proof storage of isoplus material				X	
27	Draining of pipe trench and keeping it free until refilling			X		
28	Building site instruction by isoplus representative, after request					X
29	Preparation of trench-bottom, placing of PU-bars, wooden bars or sand sacks			X		
30	Laying of isoplus pipes according to trench design in lengths and heights				X	
31	Information to isoplus in case of any modifications and wait for static acceptance		X		X	X
32	Visit of building site, discussion in order to find a solution in case of modification		X		X	X
33	Placing and connection of carrier pipes and fittings according to standard				X	
34	If necessary concrete fix-points and wait for setting			X		
35	Controlling of carrier pipe connections according to tender and standard				X	
36	Post insulation works at the jacket pipes connections					X
37	Fixing of required expansion pads in accordance to design					X
38	Eventual thermal pre-stressing (provide sand bridge)			X	X	
39	Insert wall sealing into wall penetration and concrete			X	X	
40	Acceptance of trench and approval for refilling by head of construction company	X	X			
41	Sand filling up to 100 mm above pipe-top and compressing by hand			X		
42	Filling and compressing of trench from top of sand bed			X		
43	Heat shrinking of end caps at house-connections					X
44	Installation of alarm wire-components					X
45	Removing of remaining material and leaving of building site			X	X	X
46	Handing-over of documentation and putting into operation of the line	X	X	X	X	X
47	Inspection by authorities	X	X			

This table should be considered as an example for a possible project-procedure and can be different, respectively completed, depending from the corresponding country.