# Copper fittings - K65 series

## IBP Instalfittings Sp. z o.o.

| ISSUANCE DATE | VALIDITY DATE |
| --- | --- |
| 07/08/2024 | 07/08/2029 |

# 01 Basic information

**This declaration is a Type III Environmental Product Declaration (EPD) based on the EN 15804 standard and verified according to ISO 14025 by an independent auditor.**

It contains information about the environmental impact of the declared construction materials. These aspects have been verified by an independent body in accordance with ISO 14025. In principle, a comparison or evaluation of EPD data is only possible if all data to be compared have been created in accordance with EN 15804 (see section 5.3 of the standard).

| | |
|---|---|
| EPD OWNER | **IBP Instalfittings Sp. z o.o.**<br>Stanisława Zwierzchowskiego 29 Street, 61 - 249 Poznań, Poland<br>www.ibpgroup.com.pl |
| PROGRAMME OWNER | **Instytut Techniki Budowlanej (ITB)**<br>Filtrowa 1 Street, 00 - 611 Warsaw, Poland<br>e-mail: energia@itb.pl, www.itb.pl |
| LCA ANALYSIS | A1 - A3, A4, C1 - C4 and D according to EN 15804 (cradle to grave with options) |
| YEAR OF EPD DEVELOPMENT | 2024 |
| DECLARED SERVICE LIFE | 25 years |
| PCR | ITB-PCR A document (based on PN-EN 15804) |
| DECLARED UNIT | 1 kg of product |
| REASON FOR IMPLEMENTATION | B2B |
| REPRESENTATIVENESS | European products, 2022 |

ITB cooperates with other operators of EPD programmes through the ECO-PLATFORM, (http://www.eco-platform.org/) in order to coordinate efforts to support industrial sectors while reducing verification efforts in different countries.

# 02 Manufacturer

**Conex Bänninger is a world leader in fittings used for copper, carbon steel, plastic and stainless steel pipes.**

The company's comprehensive product range consists of plumbing fittings and valves for domestic, commercial and industrial applications, working with customers in the plumbing, heating, ventilation, gas, refrigeration and medical industries.

All products covered in this study are manufactured and/or stocked at the following production facilities: the IBP Instalfittings plant at Stanisława Zwierzchowskiego 29 in Poznań (Poland), the IBP Instalfittings plant at Za Motelem 2A Sady/Tarnowo Podgórne (Poland), the IBP ATCOSA plant, Poligono Industrial, Quintos-Aeropuerto in Cordoba (Spain), the Conex Universal Limited plant, Global House 95 Vantage Point, Pensnett Trading Estate in Kingswinford (UK).


Fig. 1. IBP Instalfittings plant at Stanisława Zwierzchowskiego Street 29 in Poznań (Poland)

Fig. 2. IBP Instalfittings plant at ul. Za Motelem 2A in Sady/Tarnów Podgórny (Poland)


Fig. 3. IBP ATCOSA plant, Poligono Industrial, Quintos-Aeropuerto in Cordoba (Spain)

# 03 Products description and application

Copper fittings (material type CW107C) for brazing are available in sizes 3/8'- 2 1/8". The K65 fittings manufactured from Wieland K65 tubes allow the installation of high-pressure refrigeration equipment up to 130 bar. The fittings are particularly suitable for use with CO2 (R-744) in transcritical applications, as the K65 alloy provides a mechanical strength high enough to withstand the required pressure values.

The product is used in high-pressure air conditioning and high-pressure refrigeration applications.

The table shows the range of copper fittings.

| Picture | Fitting type | Code | Dimensions |
|---|---|---|---|
|  | 90° Bend | K5001 | from 3/8" to 2 1/8" |
|  | 90° Bend | K5002 | from 3/8" to 2 1/8" |
|  | 45° Bend | K5040 | from 3/4" to 1 5/8" |

| | | | |
|---|---|---|---|
|  | 45° Bend | K5041 | from 3/8" to 1 5/8" |
|  | Equal Tee | K5130 | from 3/8" x 3/8" x 3/8"<br>to 2 1/8" x 2 1/8" x 2 1/8" |
|  | Reducing Coupler | K5240 | from 1/2" x 3/8"<br>to 2 1/8" x 1 5/8" |
|  | Reducing Nipple | K5243 | from 1/2" x 3/8"<br>to 2 1/8" x 1 5/8" |
|  | Coupler | K5270 | from 3/8" to 2 1/8" |
|  | End Cap | K5301 | from 3/8" to 1 5/8" |

# 04 Life cycle assessment (LCA) - general principles

## Declared unit

The declared unit is the production of 1 kg of copper fittings - K65 series.

## Allocation

Production of goods takes place at the Poznań plant, from where they are sent to the Sady plant. Similarly, production takes place at the factory in Cordoba, from where the products are sent to Sady or directly to customers. In Sady, packaging of products, storage and shipping to customers takes place. At the Pensnett plant, storage and shipping to customers takes place. Inputs were inventoried for each production and storage facility. The allocation of impacts is based on the weight of K65 series products, which is a percentage of total production/sales and transport and represents: 1.62% at the Poznań site, 0.23% at theSady site, 7.2% at the Pensnett site and 4.30% at the Cordoba site. Allocation to a single, representative product was made on the basis of product weight. All raw material receipts are allocated in module A1. Production is based on copper, and waste from production is sold as scrap to other parties where it will be recycled. Module A2 includes the transport of semi-finished products between the production sites Poznań - Sady, Cordoba - Sady, Sady - Pensnett. Energy consumption, fuel consumption and waste were inventoried for the entire production process in module A3.

## System boundaries

The life cycle analysis of the declared products includes the production stage (modules A1 - A3) and modules A4, C1-C4+D ("from cradle to grave with options") according to EN 15804 and ITB PCR A.

## System limits

100% of input materials and 100% of electricity, natural gas, propane and diesel and water consumption were inventoried at the Poznan, Sady, Cordoba and Pensnett plants. All relevant parameters from the collected production data are included in the assessment, i.e. all materials consumed for production, packaging materials and utilities used, waste produced and emissions generated.

## Modules A1 and A2 Extraction and transport of raw materials

The K65 copper tubes used in the production of K65 fittings are transported from Wieland plants located in Austria and Germany. Module A1 shows the production impact of the raw materials further used in the production of the fittings. Data on the transport of raw materials is recorded by the plants. The means of transport include trucks and vans. For the calculation of module A2, global fuel averages were used.

## Module A3 Production

The production process is illustrated in the diagrams on pages 10 to 11. Once the raw materials have been delivered, they are processed, accompanied by a by-product generated by cutting, for example. The by-product is reused: it is sold to mills as their input material. Electricity, gas, water and propane are consumed in the process. Products from Poznań are sent to Sady, products from Cordoba are sent to Sady or directly to customers. From Sady, products are sent directly to customers or to Pensnett, where they are stored and also sold to customers.

## Module A4 Transport

Transport of finished goods to the customer is carried out from three locations: Pensnett in the UK, Sady in Poland and Cordoba in Spain. Finished products are packed in labelled plastic bags and placed in cartons, also labelled. The company uses wheeled and sea transport, adapted to the size of the order. The largest recipients of orders are located in Western Europe (UK, France, Germany, Netherlands), the United States and Australia. The fuels used depend on the means of transport used, but are predominantly diesel. The average transport distance is 865 km for road transport and 2146 km for sea transport.

## Module C1 Deconstruction and demolition

No information on the impact of deconstruction in the construction or any other sector is available for K65 fittings. Therefore, no contribution to the impact categories of this module is reported and the module is equal to 0.

## Module C2 Transport

It is assumed that the end-of-life product will be transported by truck to the nearest waste treatment facility (truck, diesel) within a 100 km distance.

## Module C3 Waste treatment

It was assumed that 100% of the products would be recovered and recycled.

### Module C4 Disposal

It was assumed that the products would not go to landfill at the end of their life, so the module is equal to 0.

### Module D External impacts beyond system boundaries

To obtain the net result of recycled material from the product system, the contribution of the recycled material building up the product is subtracted from the material to be recycled at the end of life. Module D shows the burdens and benefits of recycling the remaining net recycled material. The benefits are assessed at the point of functional equivalence, i.e. where there is a substitution of virgin raw material. A 70% recycled copper content in the starting material is assumed.

### Data collection period

The input data of the declared products concern the period from January to December 2022. The life cycle assessment has been prepared for Europe as a reference area.

### Data quality

The data for the LCA calculation of modules A1-A4 came from verified LCI inventory data from the plant. In accordance with Annex E of EN 15804 + A2, a data quality assessment was carried out. For technical representativeness, processes with a quality level of 'very good' represent 99% of the values for the climate change indicators. For geographical and temporal representativeness, a process evaluation level of "very good" was obtained.

### Assumptions and estimates

The impacts of the representative products were aggregated using a weighted average. The results obtained for the representative products can be applied proportionally to all types of copper fittings - series K65.

### Calculation principles

LCA was made in accordance with PN-EN 15804+A2 standard and ITB PCR A (v1.6. 2023) document.

### Databases

The data for the calculations came from Ecoinvent v. 3.8 and from databases available in Bionova OneClickLCA software. Emission factors for electricity have been supplemented with actual KOBIZE data. The GWP indicator for copper tubes was adopted from Wieland data. The characterisation factors are CML ver. 4.2 based on EN 15804+A2.

## Production scheme

Poznań

Cordoba


Coupler
Raw material supply
Cutting
Lubrication
Labelling
Washing
Inspection
Packaging
Bend
Raw material supply
Cutting and bending
Lubrication
Forming to size
Chamfering
Washing
Inspection
Packaging
End cap
Raw material supply
Stamping and labelling
Chamfering
Washing
Inspection
Packaging
Tee
Raw material supply
Cutting
Hydroforming - tee forming
Processing
Lubricating
Calibration
Washing
Inspection
Packaging
Reduction
Raw material supply
Cutting
Lubrication
Reduction
Drilling
Labelling
Washing
Inspection
Packaging
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# 05 Life cycle assessment (LCA) - Results

The declared unit is 1 kg of copper fittings - series K65 manufactured by IBP Instalfittings Sp. z o.o. The following indicates which LCA assessment modules were included in the assessment (**MA** - module assessed, **MNA** - module not assessed).

| Information on system boundaries | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product stage | | | Construction stage | | Use stage | | | | | | | End of life | | | | Benefits and loads beyond the system boundaries |
| Raw material supply | Transport | Manufacturing | Transport to construction site | Construction and installation process | Use | Maintenance | Repair | Replacement | Refurbishmentt | Operational energy use | Operational water use | Deconstruction / demolition | Transport | Waste processing | Disposal | Potential for reuse, recovery or recycling |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| MA | MA | MA | MA | MNA | MNA | MNA | MNA | MNA | MNA | MNA | MNA | MA | MA | MA | MA | MA |

## Environmental impacts

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GLOBAL WARMING POTENTIAL - TOTAL | kg CO2 eq. | 2.97E+00 | 2.65E-01 | 2.15E+00 | 5.38E+00 | 3.12E-01 | 0.00E+00 | 9.10E-03 | 1.06E-02 | 0.00E+00 | -1.47E+00 |
| GLOBAL WARMING POTENTIAL - FOSSIL | kg CO2 eq. | 2.97E+00 | 2.65E-01 | 2.18E+00 | 5.41E+00 | 3.14E-01 | 0.00E+00 | 9.09E-03 | 1.61E-02 | 0.00E+00 | -1.44E+00 |
| GLOBAL WARMING POTENTIAL - BIOGENIC | kg CO2 eq. | -1.68E-03 | 1.93E-04 | -2.97E-02 | -3.12E-02 | 4.14E-06 | 0.00E+00 | 6.60E-06 | -5.45E-03 | 0.00E+00 | -2.12E-02 |
| GLOBAL WARMING POTENTIAL - LULAC | kg CO2 eq. | 0.00E+00 | 7.98E-05 | 1.63E-03 | 1.71E-03 | 1.69E-04 | 0.00E+00 | 2.74E-06 | 1.82E-05 | 0.00E+00 | -1.43E-03 |
| DEPLETION POTENTIAL OF THE STRATOSPHERIC OZONE LAYER | kg CFC 11 eq. | 2.43E-09 | 6.23E-08 | 1.71E-07 | 2.36E-07 | 6.60E-08 | 0.00E+00 | 2.14E-09 | 9.14E-10 | 0.00E+00 | -1.02E-07 |
| ACIDIFICATION POTENTIAL | mol H+ eq. | 2.86E-03 | 1.11E-03 | 1.31E-02 | 1.70E-02 | 8.06E-03 | 0.00E+00 | 3.82E-05 | 9.62E-05 | 0.00E+00 | -1.01E-01 |
| EUTROPHICATION AQUATIC FRESHWATER | kg Pe | 3.74E-07 | 6.61E-06 | 7.16E-04 | 7.23E-04 | 5.00E-06 | 0.00E+00 | 2.27E-07 | 7.77E-07 | 0.00E+00 | -7.54E-04 |
| EUTROPHICATION AQUATIC MARINE | kg N eq. | 8.80E-04 | 3.36E-04 | 1.07E-02 | 1.19E-02 | 2.03E-03 | 0.00E+00 | 1.15E-05 | 2.77E-05 | 0.00E+00 | -5.28E-03 |
| EUTROPHICATION AQUATIC TERRESTRIAL | kg N eq. | 9.35E-03 | 3.71E-03 | 2.70E-02 | 4.01E-02 | 2.25E-02 | 0.00E+00 | 1.27E-04 | 2.34E-04 | 0.00E+00 | -7.73E-02 |
| FORMULATION POTENTIAL OF TROPOSPHERIC OZONE | kg NMVOC eq. | 2.64E-03 | 1.19E-03 | 6.57E-03 | 1.04E-02 | 5.88E-03 | 0.00E+00 | 4.08E-05 | 6.30E-05 | 0.00E+00 | -2.05E-02 |
| ABIOTIC DEPLETION POTENTIAL FOR NON-FOSSIL RESOURCES | kg Sb eq. | 0.00E+00 | 4.52E-06 | 9.55E-06 | 1.41E-05 | 2.92E-06 | 0.00E+00 | 1.55E-07 | 6.93E-07 | 0.00E+00 | 2.08E-07 |
| ABIOTIC DEPLETION POTENTIAL FOR FOSSIL RESOURCES | MJ | 0.00E+00 | 4.12E+00 | 3.69E+01 | 4.11E+01 | 4.24E+00 | 0.00E+00 | 1.41E-01 | 1.57E-01 | 0.00E+00 | 4.72E-02 |
| WATER USE | $m^3$ | 1.10E-04 | 1.53E-02 | 3.42E+00 | 3.43E+00 | 1.03E-02 | 0.00E+00 | 5.26E-04 | 4.65E-03 | 0.00E+00 | -1.91E+00 |

## Environmental aspects related to resource use

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RENEWABLE PRIMARY ENERGY AS AN ENERGY CARRIER | MJ | 2.09E-01 | 5.19E-02 | 5.78E+00 | 6.04E+00 | 3.44E-02 | 0.00E+00 | 1.78E-03 | 2.67E-02 | 0.00E+00 | -6.54E+00 |
| RENEWABLE PRIMARY ENERGY FOR MATERIAL USE | MJ | 0.00E+00 | 0.00E+00 | 5.52E-01 | 5.52E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| COMPLETELY RENEWABLE PRIMARY ENERGY | MJ | 2.09E-01 | 5.19E-02 | 6.33E+00 | 6.60E+00 | 3.44E-02 | 0.00E+00 | 1.78E-03 | 2.67E-02 | 0.00E+00 | -6.54E+00 |
| NON-RENEWABLE PRIMARY ENERGY AS AN ENERGY SOURCE | MJ | 3.47E+01 | 4.12E+00 | 3.41E+01 | 7.29E+01 | 4.24E+00 | 0.00E+00 | 1.41E-01 | 1.57E-01 | 0.00E+00 | -1.84E+01 |
| NON-RENEWABLE PRIMARY ENERGY AS MATERIA USE | MJ | 0.00E+00 | 0.00E+00 | 4.40E+00 | 4.40E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | -1.19E-01 |
| COMPLETELY NON-RENEWABLE PRIMARY ENERGY | MJ | 3.47E+01 | 4.12E+00 | 3.85E+01 | 7.73E+01 | 4.24E+00 | 0.00E+00 | 1.41E-01 | 1.57E-01 | 0.00E+00 | -1.85E+01 |
| USE OF SECONDARY RAW MATERIALS | MJ | 1.46E+00 | 0.00E+00 | 1.82E-02 | 1.48E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.93E-04 | 0.00E+00 | -1.80E-01 |
| RENEWABLE SECONDARY FUELS | MJ | 1.10E-03 | 0.00E+00 | 6.75E-04 | 1.78E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.42E-05 | 0.00E+00 | -9.33E-05 |
| NON-RENEWABLE SECONDARY FUELS | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| USE OF FRESH WATER RESOURCES | $m^3$ | 2.68E-06 | 8.59E-04 | 6.11E-02 | 6.20E-02 | 5.28E-04 | 0.00E+00 | 2.94E-05 | 1.26E-04 | 0.00E+00 | -4.25E-02 |

## Other environmental information describing the waste categories

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | A4 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|
| HAZARDOUS WASTE DESTINED FOR LANDFILL | kg | 5.06E-01 | 4.01E-03 | 9.10E-02 | 6.01E-01 | 4.45E-03 | 0.00E+00 | 1.37E-04 | 0.00E+00 | 0.00E+00 | -3.08E-01 |
| NON-HAZARDOUS WASTE DESTINED FOR DISPOSAL | kg | 1.10E-04 | 4.43E-01 | 4.93E+00 | 5.37E+00 | 1.73E-01 | 0.00E+00 | 1.52E-02 | 0.00E+00 | 0.00E+00 | -5.17E+01 |
| RADIOACTIVE WASTE FOR DISPOSAL | kg | 7.16E-05 | 2.83E-05 | 2.24E-04 | 3.24E-04 | 2.96E-05 | 0.00E+00 | 9.70E-07 | 0.00E+00 | 0.00E+00 | -6.92E-05 |
| COMPONENTS TO BE REUSED | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MATERIALS TO BE RECYCLED | kg | 0.00E+00 | 0.00E+00 | 9.90E-02 | 9.90E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.00E+00 | 0.00E+00 | -2.98E-01 |
| MATERIALS DESTINED FOR ENERGY RECOVERY | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| ELECTRICITY EXPORTED | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

## Interpretation of the results of the LCA analysis of K65 copper fittings

The following life cycle phases are responsible for the largest CO2 emissions:

- A1 Raw material supply - 51.6%
- A3 Production - 37.9%
- A4 Transport from manufacturer to installation site - 5.5%
- A2 Transport of raw materials to the production site - 4.6%

The end-of-life scenario assuming complete recycling of copper products results in a reduced carbon footprint for the products covered by this declaration, thereby minimising the environmental impact.

# 06 Verification

The verification process for this EPD is in accordance with ISO 14025 and ISO 21930. Once verified, this EPD is valid for a period of 5 years. There is no need to recalculate after 5 years if the inputs have not changed significantly.

**EN 15804 standard serves as the basis for ITB PCR-A**
**independent verification according to ISO 14025 (subsection 8.1.3.)**
**[ ] internal [x] external**

External verification of EPD: **Michał Piasecki, Professor ITB, m.piasecki@itb.pl**
Input data verification, LCI audyt, LCA: **Zuzanna Gondek, JWA, z.gondek@jw-a.pl**
LCA verification: **Michał Piasecki, Professor ITB, m.piasecki@itb.pl**

Note 1: The declaration owner has the sole ownership. liability. and responsibility for the information provided and contained in EPD. Declarations of construction products may not be comparable if they do not comply with EN 15804+A2. For further information about comparability. see EN 15804+A2 and ISO 14025.

Note 2: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent. third-party verification organization (ISO 17025/17065/17029). ITB-EPD program is recognized and registered member of The European Platform - Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

Signature Not Verified
Dokument podpisany przez Michał Piasecki; ITB
Data: 2024.08.08 13:24:40 CEST

## Normative references

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|---|
| **ITB PCR A** General Product Category Rules for Construction Products |
| **ISO 14025:2006** Environmental labels and declarations – Type III environmental declarations – Principles and procedures |
| **ISO 21930:2017** Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services |
| **ISO 14044:2006** Environmental management – Life cycle assessment – Requirements and guidelines |
| **EN 15804 +A2** Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products |
| **EN 12449** Copper and copper alloys - Seamless, round tubes for general purposes |
| **EN 1652** Copper and copper alloys - Plate, sheet, strip and circles for general purposes |
| **UL 207** UL Standard for Safety Refrigerant-Containing Components and Accessories, Nonelectrical |
| **CSA C22.2** General requirements — Canadian Electrical Code, Part II |
| **EN 12735-1** Copper and copper alloys - Seamless, round tubes for air conditioning and refrigeration - Part 1: Tubes for piping systems |
| **ASTM B280** Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service |
| **Metal Recycling Factsheet**, EuRIC AISBL – Recycling: Bridging Circular Economy & Climate Policy |

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# CERTIFICATE № 657/2024
# of TYPE III ENVIRONMENTAL DECLARATION

Products:

**Copper fittings - K65 series**

Manufacturer:

**IBP Instalfittings Sp. z o.o.**
Stanisława Zwierzchowskiego 29, 61-249 Poznań, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

**EN 15804+A2**

**Sustainability of construction works.**
**Environmental product declarations.**
**Core rules for the product category of construction products.**

This certificate, issued on 7th August 2024 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics and Environment Department
Agnieszka Winkler-Skalna, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, August 2024