

# اصل و ارزان بخرید

"NDTKALA" کالای بازرسان متخصص جوش ایران

تامین تجهیزات و مواد مصرفی تست های غیر مخرب ایران

تحویل کالا در تهران ۲ ساعته و در شهرستان ها ۲۴ ساعته انجام می پذیرد



۰۲۱-۷۱۰۵۳۸۸۸



[www.NDTKALA.net](http://www.NDTKALA.net)





## Industrial Radiographic Film System



Bundesanstalt für  
Materialforschung  
und -prüfung

**Certificate No. BAM/ZBF/004/12**  
**2<sup>nd</sup> Revised version**

12200 Berlin, Germany  
T: +49 30 8104-0  
F: +49 30 8104-7 2222

Hereby it is certified by the BAM Certification Body that the industrial X-ray film system with the designation

**Indux R4 CERT**  
**Fomadux R4 CERT**  
**processed in the**  
**developer AGFA G 135,**  
**automatic film processing with immersion time of 100 seconds,**  
**developer temperature 28 °C,**

of the manufacturer

**FOMA BOHEMIA spol. s r.o.**  
**Hradec Králové / Czech Republic**

meets the requirements of the **system classification C3** for industrial x-ray films for radiographic testing according to **ISO 11699-1:2008** and **DIN EN ISO 11699-1:2012** as well as the requirements of the **ASTM system class I** according to **ASTM E 1815-08 (2013)**.

The certification has been performed on the basis of certification contract No. BAM - ZBF - 0001 - 2011 - FDMA according to the requirements of the standard EN ISO/IEC 17065:2012 and comprises a type examination with surveillance of the products as well as of the production site (BAM Certification Systems IIa and IIb - surveillance of the products and quarterly surveillance of the measuring data from the continuous production as well as additionally the surveillance of the production site). The products certified by BAM may be labeled with the BAM certification mark "BAM Geprüft und überwacht" and/or "BAM Certified and under surveillance".

The certificate is valid until **January 30, 2022**.

The certificate is based on the test report No. 8.3/7282 of 2011-12-20 as well as on procedure n° BZS-GS/047/16.

for Bundesanstalt für Materialforschung und -prüfung (BAM)  
Unter den Eichen 87, 12205 Berlin, **2017-01-31**

Dr. R. Grätz  
BAM Certification Body



Dr. U. Ewert  
BAM Assessor

Distribution list: 1<sup>st</sup> Certificate holder

2<sup>nd</sup> BAM Certification Body

The BAM Certification Body has been accredited according to standard EN ISO/IEC 17065:2012 by the DAkkS (Deutsche Akkreditierungsstelle GmbH). The accreditation is valid for the scope given in certificate D-ZE-11075-21-00.

This certificate may only be published in full wording and without any additions. A revocable written consent shall be obtained from BAM beforehand for any amended reproduction or the publication of any excerpts. The German version is exclusively legally binding. Place of jurisdiction is Berlin.

CERTIFICATE



## Industrial Radiographic Film System



Bundesanstalt für  
Materialforschung  
und -prüfung

**Certificate No. BAM/ZBF/018/12**  
**2<sup>nd</sup> Revised version**

Hereby it is certified by the BAM Certification Body that the industrial X-ray film system with the designation

12200 Berlin, Germany  
T: +49 30 8104-0  
F: +49 30 8104-7 2222

**Indux R5 CERT**  
**Fomadux R5 CERT**  
**processed in the**  
**developer AGFA G 135,**  
**automatic film processing with immersion time of 100 seconds,**  
**developer temperature 28 °C,**

of the manufacturer

**FOMA BOHEMIA spol. s r.o.**  
**Hradec Králové / Czech Republic**

meets the requirements of the **system classification C4** for industrial x-ray films for radiographic testing according to **ISO 11699-1:2008** and **DIN EN ISO 11699-1:2012** as well as the requirements of the **ASTM system class I** according to **ASTM E 1815-08 (2013)**.

The certification has been performed on the basis of certification contract No. BAM – ZBF – 0001 – 2011 – FOMA according to the requirements of the standard EN ISO/IEC 17065:2012 and comprises a type examination with surveillance of the products as well as of the production site (BAM Certification Systems IIa and IIb – surveillance of the products and quarterly surveillance of the measuring data from the continuous production as well as additionally the surveillance of the production site). The products certified by BAM may be labeled with the BAM certification mark "BAM Geprüft und überwacht" and/or "BAM Certified and under surveillance".

The certificate is valid until **January 30, 2022**.

The certificate is based on the test report No. 8.3/7403 of 2012-10-26 as well as on procedure n° BZS-GS/047/16.

for Bundesanstalt für Materialforschung und -prüfung (BAM)  
Unter den Eichen 87 12205 Berlin, **2017-01-31**

Dr. R. Grätz  
BAM Certification Body



Dr. U. Ewert  
BAM Assessor

Distribution list: 1<sup>st</sup> Certificate holder 2<sup>nd</sup> BAM Certification Body

The BAM Certification Body has been accredited according to standard EN ISO/IEC 17065:2012 by the DAkkS (Deutsche Akkreditierungsstelle GmbH). The accreditation is valid for the scope given in certificate D-ZE-11075-21-00.

This certificate may only be published in full wording and without any additions. A revocable written consent shall be obtained from BAM beforehand for any amended reproduction or the publication of any excerpts. The German version is exclusively legally binding. Place of jurisdiction is Berlin.

CERTIFICATE





## Industrial Radiographic Film System



Bundesanstalt für  
Materialforschung  
und -prüfung

**Certificate No. BAM/ZBF/002/2011**  
**2<sup>nd</sup> Revised version**

12200 Berlin, Germany  
T: +49 30 8104-0  
F: +49 30 8104-7 2222

Hereby it is certified by the BAM Certification Body that the industrial X-ray film system with the designation

**Indux R7 CERT**  
**Fomadux R7 CERT**  
**processed in the**  
**developer AGFA G 135,**  
**automatic film processing with immersion time of 100 seconds,**  
**developer temperature 28 °C,**

of the manufacturer

**FOMA BOHEMIA spol. s r.o.**  
**Hradec Králové / Czech Republic**

meets the requirements of the **system classification C5** for industrial x-ray films for radiographic testing according to **ISO 11699-1:2008** and **DIN EN ISO 11699-1:2012** as well as the requirements of the **ASTM system class II** according to **ASTM E 1815-08 (2013)**.

The certification has been performed on the basis of certification contract No. BAM – ZBF – 0001 – 2011 – FOMA according to the requirements of the standard EN ISO/IEC 17065:2012 and comprises a type examination with surveillance of the products as well as of the production site (BAM Certification Systems IIa and IIb – surveillance of the products and quarterly surveillance of the measuring data from the continuous production as well as additionally the surveillance of the production site). The products certified by BAM may be labeled with the BAM certification mark "BAM Geprüft und überwacht" and/or "BAM Certified and under surveillance".

The certificate is valid until **January 30, 2022**.

The certificate is based on the test report No. 8.3/7212 of 2010-12-01 as well as on procedure n° BZS-GS/047/16.

for Bundesanstalt für Materialforschung und -prüfung (BAM)  
Unter den Eichen 87, 12205 Berlin, **2017-01-31**

Dr. R. Grätz  
BAM Certification Body



Dr. U. Ewert  
BAM Assessor

Distribution list: 1<sup>st</sup> Certificate holder 2<sup>nd</sup> BAM Certification Body

The BAM Certification Body has been accredited according to standard EN ISO/IEC 17065:2012 by the DAkkS (Deutsche Akkreditierungsstelle GmbH). The accreditation is valid for the scope given in certificate D-ZE-11075-21-00.

This certificate may only be published in full wording and without any additions. A revocable written consent shall be obtained from BAM beforehand for any amended reproduction or the publication of any excerpts. The German version is exclusively legally binding. Place of jurisdiction is Berlin.

CERTIFICATE

# FOMADUX NDT ROLLFILM

## TECHNICAL RADIOGRAPHIC FILMS

### Characteristics of the product

FOMADUX NDT ROLLFILM is a special confectioning form of technical radiographic film with designed for non-destructive material testing with use of X- or gamma radiation. The special form of the packaging ensures the film's resistance to light, humidity and greasy impurities.

The film is placed between two lead screens (thickness 0,025 mm) of the same dimensions; the screens are in perfect contact with the film; the film is packed in a light- and moisture-proof package – using the “edge to edge” system.

### Usage

This kind of film is ideal solution for testing of long welds, e.g. welds of pipelines, pressure vessels or large parts in the aerospace industry, as the length can be chosen so that all the radiogram can be exposed to a single piece of film.

Packed film is wound onto a cardboard core and inserted in a transport box from which required length can be simply wound out. There is a print in the package axis on the side with folded edges; the print helps determine the film center and the film length. Contact of the film with a wet or impure object has no effect on the quality of the final radiograph.

How to remove the film from the package before processing: In a dark room hold the non-printed part of the package together with lead screen and the film with one hand and strip off the printed part of the package and the second lead screen with the other hand. Thus the film will be easily and quickly removed from the package.

### Advantages of the rollfilm

The full length of the weld can be radiographed onto a single piece of film, i.e. we avoid using several film sheets for one weld. Required film length is determined according to the weld length. Further advantages:

- Using without cassettes
- Lightproof package is resistant to humidity and greasy impurities
- By single – usage films we avoid faults caused by their repeated usage
- Perfect contact between the film, lead screens and checked object ensures optimal quality of the image
- The “edge to edge” packing system allows optimal use of the film surface where there is not sufficient space for placing the film

### Processing

FOMADUX is intended both for the manual and automatic processing.

### Processing technology

Long films must be processed carefully. Generally it is possible to split the film after marking it and then to process it in the ordinary way or to fully exploit the advantages of the ROLLFILM package and process it in full length.

- When machine processing it is necessary to ensure precise leading (by a suitable jig) of the film into the axis of the developing machine.
- In manual processing of ROLLFILM, prior to processing it is necessary to wind the film into a special wire coil that facilitates contact of the film with baths. It is also possible to split the film and process it in parts in ordinary frames used for processing in a darkroom.

### Recommended chemicals for the manual processing:

FOMADUX LP-T Developer

(5 minutes of developing time at 20 °C, dilution 1 + 3)

FOMAFIX Rapid Fixer

FOTONAL Wetting Agent

### Recommended chemicals for the automatic processing:

FOMADUX LP-D Developer-Replenisher

(2 minutes of developing time at 28 °C)

FOMA LP-DS Developer Starter

FOMADUX MIX - Hardening Fixer – part A (fixer) + part B (hardener)

FOMADUX NDT ROLLFILM can also be processed in FOMA ECO chemie (FOMADUX LP-ECO, FOMADUX FIX-ECO) intended for both automatic and manual processing or in corresponding processing chemicals of other manufacturers.

### Darkroom illumination

The film is processed at yellow-orange safety illumination with wavelength of 590 nm. Length of exposure and a distance of the processed material from the illumination source should be tested.

### Archiving of processed films

The manufacturer guarantees the archival permanence of minimum 50 years when complying with conditions following:

- films must be perfectly fixed and washed
- films must be stored at a relative humidity of 30 to 60% out of reach of harmful gases.

### Storage of unexposed films

Unexposed films should be stored in the original packaging in a cool, dry place (temperature ranging from 10 to 25 °C, relative humidity from 40 to 60 %), out of reach of harmful vapours, gases and ionizing radiations. Exposed films should be processed as soon as possible.

### Packaging

#### Rollfilm with Pb

- lightproof, humidity and greasy resistant
- sandwiched between two lead screens (thickness 0,025 mm)
- width 60, 70 or 100 mm in length up to 90 m.

#### Rollfilm BLR

- bare rollfilm
- intended for using in cassettes
- width 60, 70 mm or 100 mm in length up to 150 m.

*By using and processing of the product Fomandux arise wastes, which is necessary to environmentally liquidate according to valid legislation.*

### Wastes:

- packaging foil : PET / AL / PE or PAPER / PE / PAPER
- Pb foil
- waste developers
- waste fixers

Information according to Article 33 of REACH: The product FOMADUX contains lead. This substance is included in the list of substances (for possible inclusion in Annex XIV). After handling, hygiene rules must be followed. More information at [www.foma.cz](http://www.foma.cz)

The product has been produced and marketed in conformity with a quality system according to the international standard EN ISO 9001.

# INDUX R4, INDUX R5 and INDUX R7

## INDUSTRIAL X-RAY FILMS

### General information

**INDUX R4, R5 and R7** are the industrial radiographic films intended for non-destructive material testing using X- or gamma radiation.

**INDUX R4** is a medium-speed, high-contrast, extremely fine-grain film, corresponds with the class C3 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class I.

**INDUX R5** is a standard-speed, high-contrast, very fine-grain film, corresponds with the class C4 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class I.

**INDUX R7** is high-speed, high contrast, fine-grain film, corresponds with the class C5 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class II.

All films are suitable for radiography with or without lead screens and meet requirements for the most standard applications.

### Applications

**INDUX R4** should be used at low voltages for the radiography of thin-to-medium thick-walled light metal parts/ products. At higher voltages the film is suitable for the testing of thick-walled light metal or thin-walled steel parts/products. With high-energy gamma rays the film is suitable for the radiography of thick-walled dense metal parts/products.

**INDUX R5** is suitable for the radiography of medium-walled steel or thick-walled light metal parts/products.

**INDUX R7** should be used at low voltages for the radiography of medium-walled light metal or thin-walled steel parts/products. At higher voltages the film is suitable for the testing of thick-walled light metal or medium-walled steel parts/products. With high-energy gamma rays the film is suitable for the radiography of thicker-to-thickest dense metal parts/products.

### Packaging forms

daylight packaging (FOMAPAK) – one-sheet vacuum-sealed packaging with lead screens of 0,025 mm thickness

Sizes: 6x10, 6x12, 6x16, 6x20, 6x24, 6x30, 6x40, 6x48, 10x10, 10x12, 10x16, 10x20, 10x24, 10x30, 10x40, 10x48, 18x24, 30x40 cm in boxes and other sizes according to an agreement with manufacturer.

The vacuum-sealed packaging FOMAPAK ensures optimum contact of film surface with lead screens, simple handling, and is light-tight, airtight and waterproof.

darkroom packaging (KB)

Sizes: 6x24, 6x40, 6x48, 10x12, 10x20, 10x24, 10x40, 10x48, 10x72, 18x24, 30x40 cm in boxes and other sizes according to an agreement with manufacturer.

Rollfilm packaging

- rollfilm with lead screen
- bare rollfilm (BLR)

for more details see the technical data sheet of ROLLFILM

Other sizes are subject to an agreement with the manufacturer.

### Film base

INDUX R4, R5 and R7 are manufactured on a dimensionally stable bluish polyester base of 0,175 mm thickness.

### Screens

Screens-packed kinds (FOMAPAK) content lead screens 0,025 mm thick, backed by a paper of 70 - 90 g/sqm of basic weight, on both film sides.

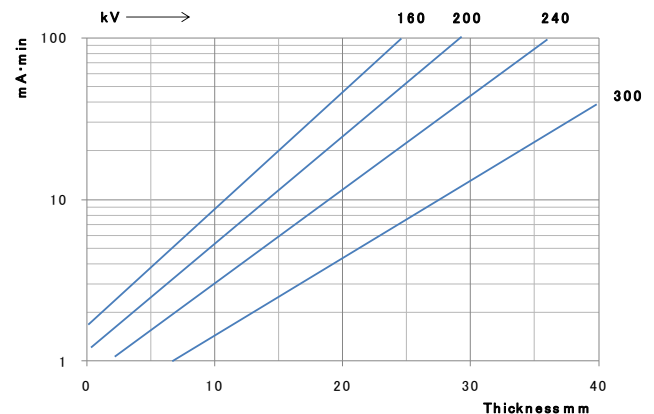
### Darkroom illumination

The film is processed at yellow-orange safety illumination with wavelength of 590 nm. Length of exposure and a distance of the processed material from the illumination source should be tested.

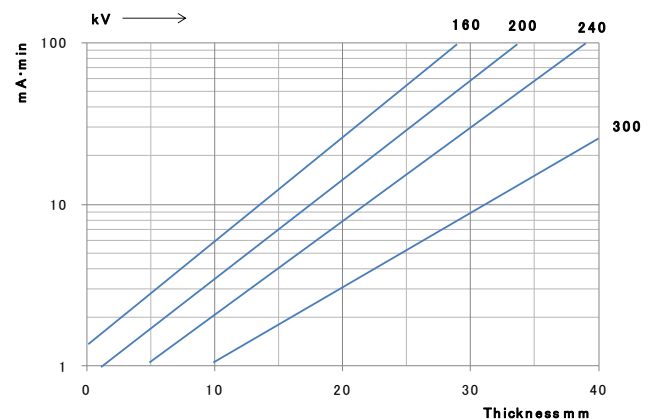
### Exposure charts for steel

For optical density  $D=2$ , front and back lead screens 0,025 mm thick, automatic processing, FOMADUX LP-D Developer, 8 minute processing cycle at 28 °C (corresponds with 2 minutes of developing time).

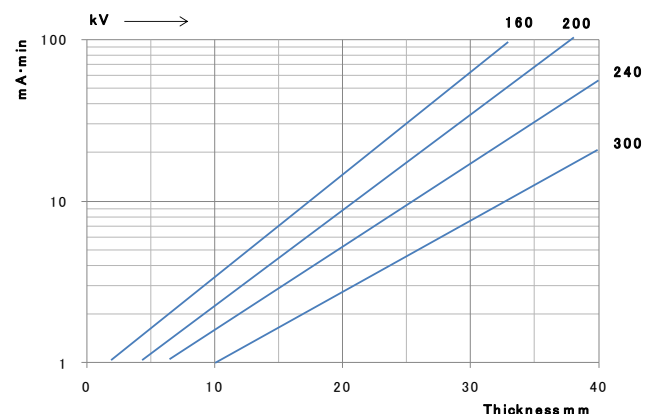
#### X-rays (SFD = 100 cm) INDUX R4



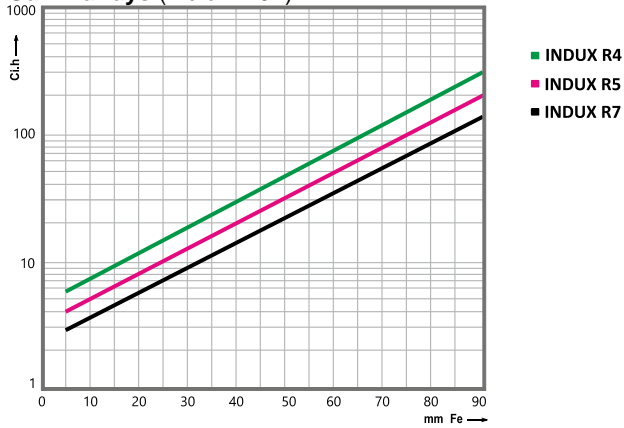
#### X-rays (SFD = 100 cm) INDUX R5



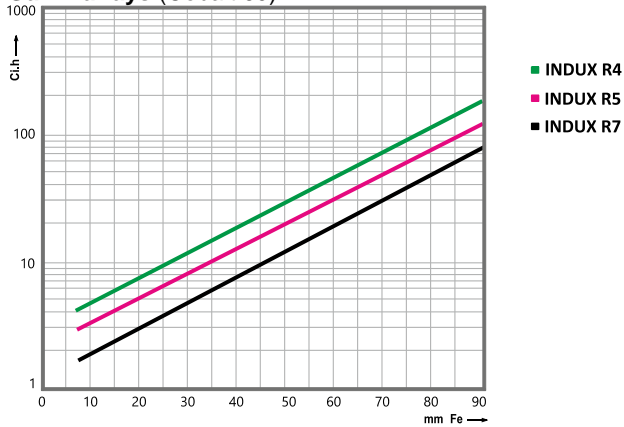
#### X-rays (SFD = 100 cm) INDUX R7



### Gamma rays (Iridium 192)



### Gamma rays (Cobalt 60)



### Processing

INDUX R4, R5 and R7 are intended both for the manual and automatic processing.

#### Recommended chemicals for the manual processing:

FOMADUX LP-T Developer  
(5 minutes of developing time at 20 °C, dilution 1 + 3)  
FOMAFIX Rapid Fixer  
FOTONAL Wetting Agent

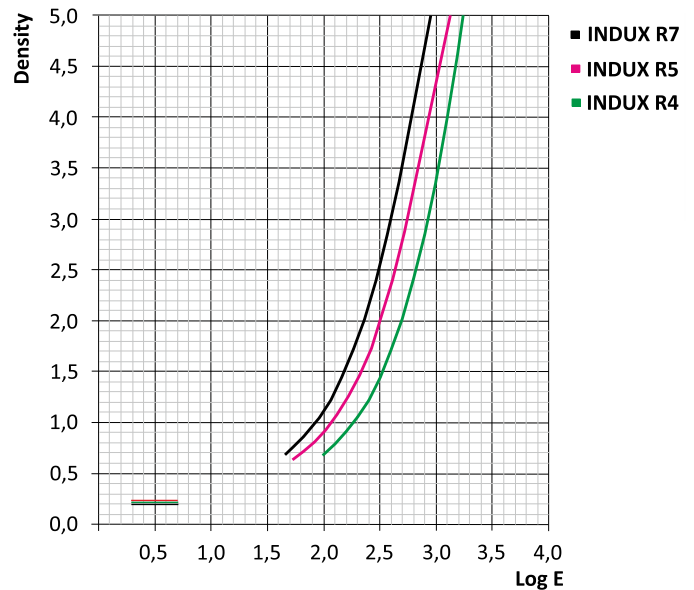
#### Recommended chemicals for the automatic processing:

FOMADUX LP-D Developer-Replenisher  
(2 minutes of developing time at 28 °C)  
FOMA LP-DS Developer Starter  
FOMADUX MIX - Hardening Fixer – part A (fixer) + part B (hardener)

FOMA industrial X-ray films INDUX R4, R5 and R7 can also be processed in FOMA ECO chemie (FOMADUX LP-ECO, FOMADUX FIX – ECO) intended for both automatic and manual processing or in corresponding processing chemicals of other manufacturers.

### Sensitometric characteristics

220 kV / 10 mA / 8 mm Cu, automatic developing, FOMADUX LP-D Developer, 8 minute processing cycle at 28 °C (corresponds with 2 minutes of developing time).



### Archiving of processed films

The manufacturer guarantees the archival permanence of minimum 50 years when complying with conditions following:

- films must be perfectly fixed and washed
- films must be stored at a relative humidity of 30 to 60% out of reach of harmful gases.

### Storage of unexposed films

Unexposed films should be stored in the vertical position in the original packaging in a cool, dry place (temperature ranging from 10 to 25 °C, relative humidity from 40 to 60 %), out of reach of harmful vapours, gases and ionizing radiations.

After opening the film bag, you must re-close it with two folds to secure it against opening. This prevents air moisture from entering the film bag.

Exposed films should be processed as soon as possible.

*By using and processing of the product Indux R4, R5 and R7 arise wastes, which is necessary to environmentally liquidate according to valid legislation.*

#### Wastes:

- packaging foil : PET / AL / PE or PAPER / PE / PAPER
- Pb foil
- waste developers
- waste fixers

Information according to Article 33 of REACH: The product INDUX contains lead. This substance is included in the list of substances (for possible inclusion in Annex XIV). After handling, hygiene rules must be followed. More information at [www.foma.cz](http://www.foma.cz)

The product has been produced and marketed in conformity with a quality system according to the international standard ISO 9001.



# INDUX R4, INDUX R5 and INDUX R7

## INDUSTRIAL X-RAY FILMS

### General information

**INDUX R4, R5 and R7** are the industrial radiographic films intended for non-destructive material testing using X- or gamma radiation.

**INDUX R4** is a medium-speed, high-contrast, extremely fine-grain film, corresponds with the class C3 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class I.

**INDUX R5** is a standard-speed, high-contrast, very fine-grain film, corresponds with the class C4 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class I.

**INDUX R7** is high-speed, high contrast, fine-grain film, corresponds with the class C5 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class II.

All films are suitable for radiography with or without lead screens and meet requirements for the most standard applications.

### Applications

**INDUX R4** should be used at low voltages for the radiography of thin-to-medium thick-walled light metal parts/ products. At higher voltages the film is suitable for the testing of thick-walled light metal or thin-walled steel parts/products. With high-energy gamma rays the film is suitable for the radiography of thick-walled dense metal parts/products.

**INDUX R5** is suitable for the radiography of medium-walled steel or thick-walled light metal parts/products.

**INDUX R7** should be used at low voltages for the radiography of medium-walled light metal or thin-walled steel parts/products. At higher voltages the film is suitable for the testing of thick-walled light metal or medium-walled steel parts/products. With high-energy gamma rays the film is suitable for the radiography of thicker-to-thickest dense metal parts/products.

### Packaging forms

daylight packaging (FOMAPAK) – one-sheet vacuum-sealed packaging with lead screens of 0,025 mm thickness

Sizes: 6x10, 6x12, 6x16, 6x20, 6x24, 6x30, 6x40, 6x48, 10x10, 10x12, 10x16, 10x20, 10x24, 10x30, 10x40, 10x48, 18x24, 30x40 cm in boxes and other sizes according to an agreement with manufacturer.

The vacuum-sealed packaging FOMAPAK ensures optimum contact of film surface with lead screens, simple handling, and is light-tight, airtight and waterproof.

darkroom packaging (KB)

Sizes: 6x24, 6x40, 6x48, 10x12, 10x20, 10x24, 10x40, 10x48, 10x72, 18x24, 30x40 cm in boxes and other sizes according to an agreement with manufacturer.

Rollfilm packaging

- rollfilm with lead screen
- bare rollfilm (BLR)

for more details see the technical data sheet of ROLLFILM

Other sizes are subject to an agreement with the manufacturer.

### Film base

INDUX R4, R5 and R7 are manufactured on a dimensionally stable bluish polyester base of 0,175 mm thickness.

### Screens

Screens-packed kinds (FOMAPAK) content lead screens 0,025 mm thick, backed by a paper of 70 - 90 g/sqm of basic weight, on both film sides.

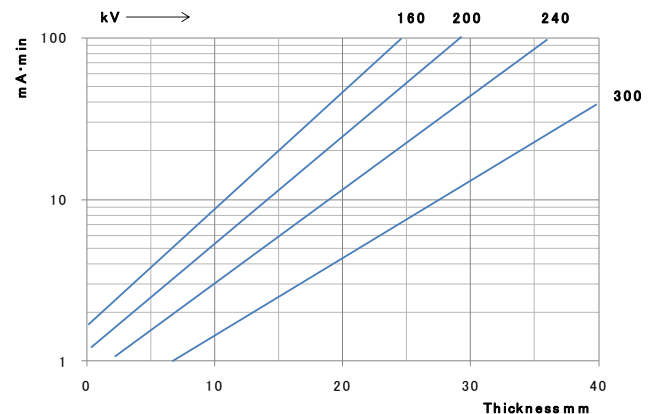
### Darkroom illumination

The film is processed at yellow-orange safety illumination with wavelength of 590 nm. Length of exposure and a distance of the processed material from the illumination source should be tested.

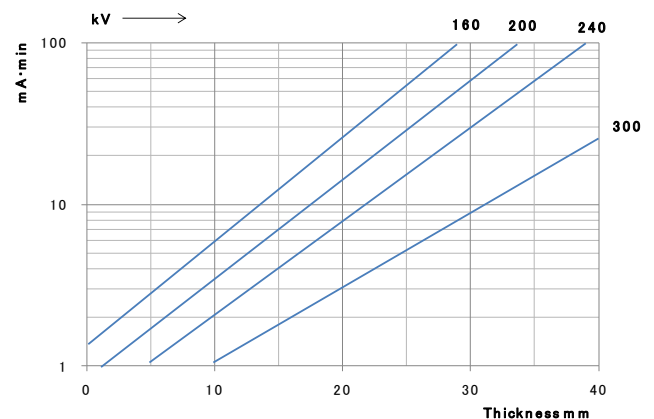
### Exposure charts for steel

For optical density  $D=2$ , front and back lead screens 0,025 mm thick, automatic processing, FOMADUX LP-D Developer, 8 minute processing cycle at 28 °C (corresponds with 2 minutes of developing time).

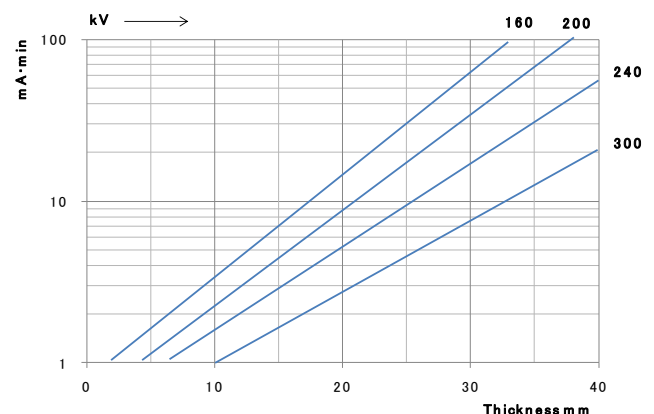
### X-rays (SFD = 100 cm) INDUX R4



### X-rays (SFD = 100 cm) INDUX R5

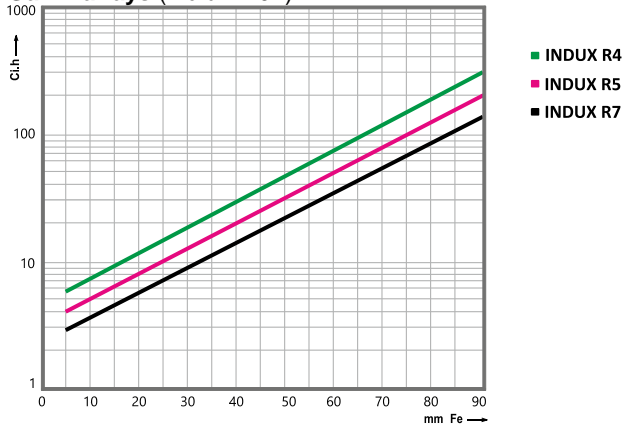


### X-rays (SFD = 100 cm) INDUX R7

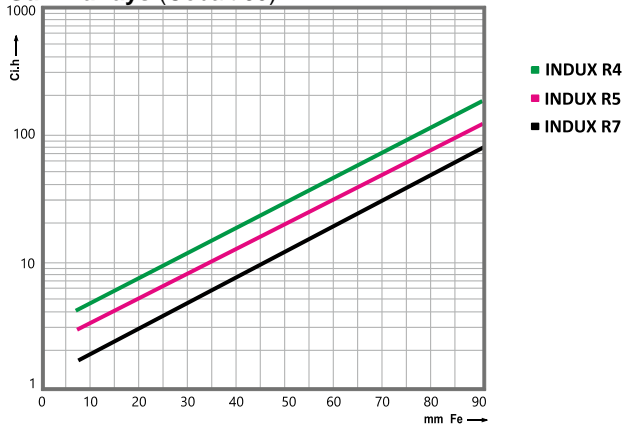




### Gamma rays (Iridium 192)



### Gamma rays (Cobalt 60)



### Processing

INDUX R4, R5 and R7 are intended both for the manual and automatic processing.

#### Recommended chemicals for the manual processing:

FOMADUX LP-T Developer  
(5 minutes of developing time at 20 °C, dilution 1 + 3)  
FOMAFIX Rapid Fixer  
FOTONAL Wetting Agent

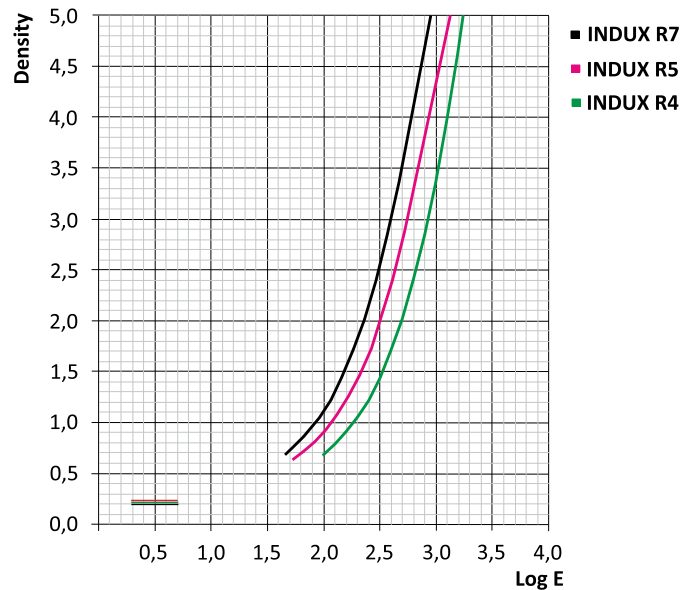
#### Recommended chemicals for the automatic processing:

FOMADUX LP-D Developer-Replenisher  
(2 minutes of developing time at 28 °C)  
FOMA LP-DS Developer Starter  
FOMADUX MIX - Hardening Fixer – part A (fixer) + part B (hardener)

FOMA industrial X-ray films INDUX R4, R5 and R7 can also be processed in FOMA ECO chemie (FOMADUX LP-ECO, FOMADUX FIX – ECO) intended for both automatic and manual processing or in corresponding processing chemicals of other manufacturers.

### Sensitometric characteristics

220 kV / 10 mA / 8 mm Cu, automatic developing, FOMADUX LP-D Developer, 8 minute processing cycle at 28 °C (corresponds with 2 minutes of developing time).



### Archiving of processed films

The manufacturer guarantees the archival permanence of minimum 50 years when complying with conditions following:

- films must be perfectly fixed and washed
- films must be stored at a relative humidity of 30 to 60% out of reach of harmful gases.

### Storage of unexposed films

Unexposed films should be stored in the vertical position in the original packaging in a cool, dry place (temperature ranging from 10 to 25 °C, relative humidity from 40 to 60 %), out of reach of harmful vapours, gases and ionizing radiations.

After opening the film bag, you must re-close it with two folds to secure it against opening. This prevents air moisture from entering the film bag.

Exposed films should be processed as soon as possible.

*By using and processing of the product Indux R4, R5 and R7 arise wastes, which is necessary to environmentally liquidate according to valid legislation.*

#### Wastes:

- packaging foil : PET / AL / PE or PAPER / PE / PAPER
- Pb foil
- waste developers
- waste fixers

Information according to Article 33 of REACH: The product INDUX contains lead. This substance is included in the list of substances (for possible inclusion in Annex XIV). After handling, hygiene rules must be followed. More information at [www.foma.cz](http://www.foma.cz)

The product has been produced and marketed in conformity with a quality system according to the international standard ISO 9001.



# INDUX R4, INDUX R5 and INDUX R7

## INDUSTRIAL X-RAY FILMS

### General information

**INDUX R4, R5 and R7** are the industrial radiographic films intended for non-destructive material testing using X- or gamma radiation.

**INDUX R4** is a medium-speed, high-contrast, extremely fine-grain film, corresponds with the class C3 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class I.

**INDUX R5** is a standard-speed, high-contrast, very fine-grain film, corresponds with the class C4 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class I.

**INDUX R7** is high-speed, high contrast, fine-grain film, corresponds with the class C5 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class II.

All films are suitable for radiography with or without lead screens and meet requirements for the most standard applications.

### Applications

**INDUX R4** should be used at low voltages for the radiography of thin-to-medium thick-walled light metal parts/ products. At higher voltages the film is suitable for the testing of thick-walled light metal or thin-walled steel parts/products. With high-energy gamma rays the film is suitable for the radiography of thick-walled dense metal parts/products.

**INDUX R5** is suitable for the radiography of medium-walled steel or thick-walled light metal parts/products.

**INDUX R7** should be used at low voltages for the radiography of medium-walled light metal or thin-walled steel parts/products. At higher voltages the film is suitable for the testing of thick-walled light metal or medium-walled steel parts/products. With high-energy gamma rays the film is suitable for the radiography of thicker-to-thickest dense metal parts/products.

### Packaging forms

**daylight packaging (FOMAPAK)** – one-sheet vacuum-sealed packaging with lead screens of 0,025 mm thickness

Sizes: 6x10, 6x12, 6x16, 6x20, 6x24, 6x30, 6x40, 6x48, 10x10, 10x12, 10x16, 10x20, 10x24, 10x30, 10x40, 10x48, 18x24, 30x40 cm in boxes and other sizes according to an agreement with manufacturer.

The vacuum-sealed packaging FOMAPAK ensures optimum contact of film surface with lead screens, simple handling, and is light-tight, airtight and waterproof.

### darkroom packaging (KB)

Sizes: 6x24, 6x40, 6x48, 10x12, 10x20, 10x24, 10x40, 10x48, 10x72, 18x24, 30x40 cm in boxes and other sizes according to an agreement with manufacturer.

### Rollfilm packaging

- rollfilm with lead screen
- bare rollfilm (BLR)

for more details see the technical data sheet of ROLLFILM

Other sizes are subject to an agreement with the manufacturer.

### Film base

INDUX R4, R5 and R7 are manufactured on a dimensionally stable bluish polyester base of 0,175 mm thickness.

### Screens

Screens-packed kinds (FOMAPAK) content lead screens 0,025 mm thick, backed by a paper of 70 - 90 g/sqm of basic weight, on both film sides.

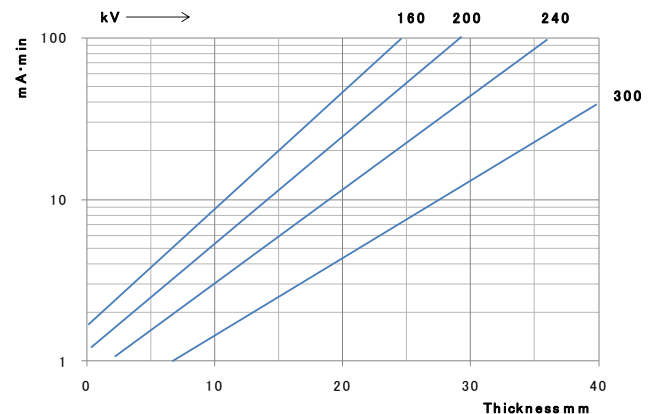
### Darkroom illumination

The film is processed at yellow-orange safety illumination with wavelength of 590 nm. Length of exposure and a distance of the processed material from the illumination source should be tested.

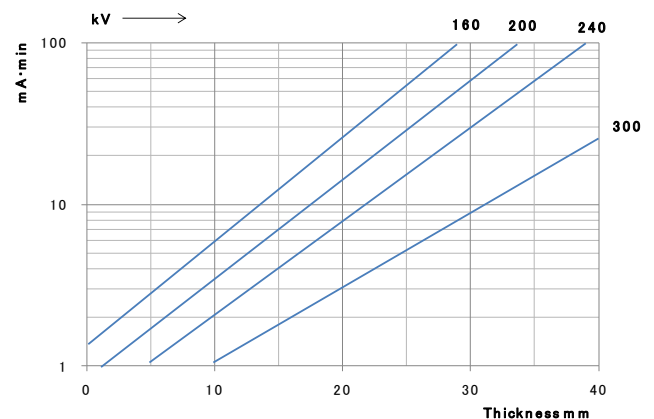
### Exposure charts for steel

For optical density  $D=2$ , front and back lead screens 0,025 mm thick, automatic processing, FOMADUX LP-D Developer, 8 minute processing cycle at 28 °C (corresponds with 2 minutes of developing time).

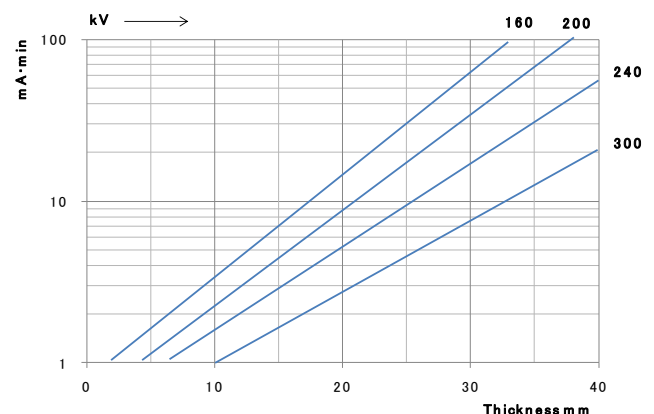
### X-rays (SFD = 100 cm) INDUX R4



### X-rays (SFD = 100 cm) INDUX R5

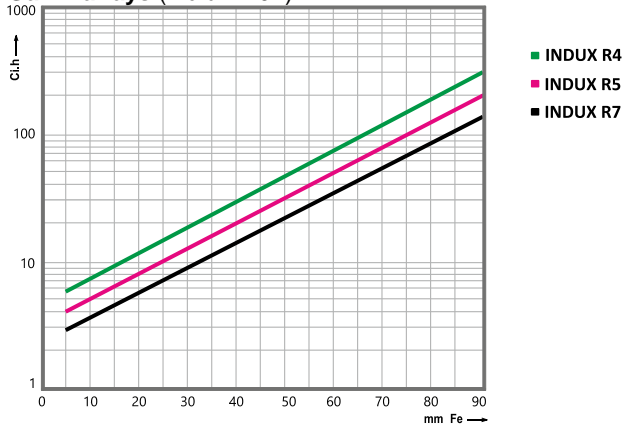


### X-rays (SFD = 100 cm) INDUX R7

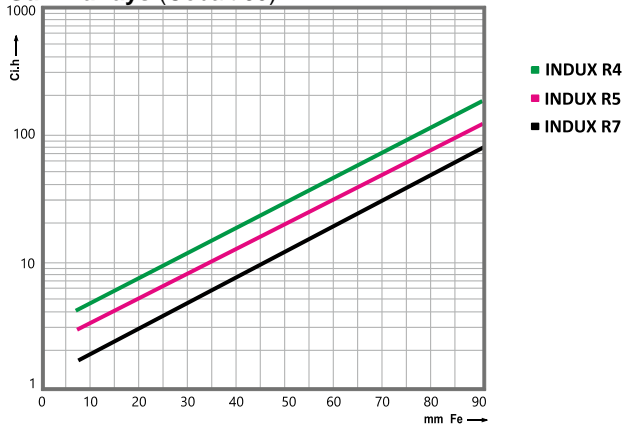




### Gamma rays (Iridium 192)



### Gamma rays (Cobalt 60)



### Processing

INDUX R4, R5 and R7 are intended both for the manual and automatic processing.

#### Recommended chemicals for the manual processing:

FOMADUX LP-T Developer  
(5 minutes of developing time at 20 °C, dilution 1 + 3)  
FOMAFIX Rapid Fixer  
FOTONAL Wetting Agent

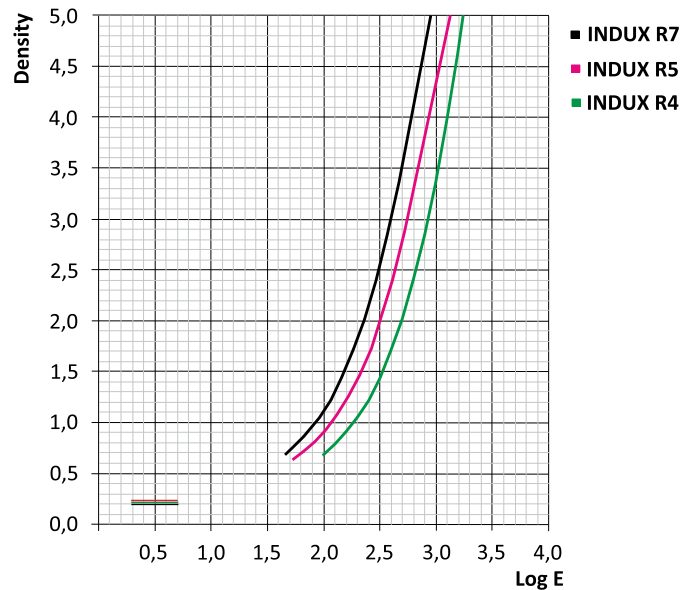
#### Recommended chemicals for the automatic processing:

FOMADUX LP-D Developer-Replenisher  
(2 minutes of developing time at 28 °C)  
FOMA LP-DS Developer Starter  
FOMADUX MIX - Hardening Fixer – part A (fixer) + part B (hardener)

FOMA industrial X-ray films INDUX R4, R5 and R7 can also be processed in FOMA ECO chemie (FOMADUX LP-ECO, FOMADUX FIX – ECO) intended for both automatic and manual processing or in corresponding processing chemicals of other manufacturers.

### Sensitometric characteristics

220 kV / 10 mA / 8 mm Cu, automatic developing, FOMADUX LP-D Developer, 8 minute processing cycle at 28 °C (corresponds with 2 minutes of developing time).



### Archiving of processed films

The manufacturer guarantees the archival permanence of minimum 50 years when complying with conditions following:

- films must be perfectly fixed and washed
- films must be stored at a relative humidity of 30 to 60% out of reach of harmful gases.

### Storage of unexposed films

Unexposed films should be stored in the vertical position in the original packaging in a cool, dry place (temperature ranging from 10 to 25 °C, relative humidity from 40 to 60 %), out of reach of harmful vapours, gases and ionizing radiations.

After opening the film bag, you must re-close it with two folds to secure it against opening. This prevents air moisture from entering the film bag.

Exposed films should be processed as soon as possible.

*By using and processing of the product Indux R4, R5 and R7 arise wastes, which is necessary to environmentally liquidate according to valid legislation.*

#### Wastes:

- packaging foil : PET / AL / PE or PAPER / PE / PAPER
- Pb foil
- waste developers
- waste fixers

Information according to Article 33 of REACH: The product INDUX contains lead. This substance is included in the list of substances (for possible inclusion in Annex XIV). After handling, hygiene rules must be followed. More information at [www.foma.cz](http://www.foma.cz)

The product has been produced and marketed in conformity with a quality system according to the international standard ISO 9001.



# INDUX R4, INDUX R5 and INDUX R7

## INDUSTRIAL X-RAY FILMS

### General information

**INDUX R4, R5 and R7** are the industrial radiographic films intended for non-destructive material testing using X- or gamma radiation.

**INDUX R4** is a medium-speed, high-contrast, extremely fine-grain film, corresponds with the class C3 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class I.

**INDUX R5** is a standard-speed, high-contrast, very fine-grain film, corresponds with the class C4 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class I.

**INDUX R7** is high-speed, high contrast, fine-grain film, corresponds with the class C5 classification according to EN ISO 11699-1 standard and according to ASTM E1815 standard with class II.

All films are suitable for radiography with or without lead screens and meet requirements for the most standard applications.

### Applications

**INDUX R4** should be used at low voltages for the radiography of thin-to-medium thick-walled light metal parts/ products. At higher voltages the film is suitable for the testing of thick-walled light metal or thin-walled steel parts/products. With high-energy gamma rays the film is suitable for the radiography of thick-walled dense metal parts/products.

**INDUX R5** is suitable for the radiography of medium-walled steel or thick-walled light metal parts/products.

**INDUX R7** should be used at low voltages for the radiography of medium-walled light metal or thin-walled steel parts/products. At higher voltages the film is suitable for the testing of thick-walled light metal or medium-walled steel parts/products. With high-energy gamma rays the film is suitable for the radiography of thicker-to-thickest dense metal parts/products.

### Packaging forms

**daylight packaging (FOMAPAK)** – one-sheet vacuum-sealed packaging with lead screens of 0,025 mm thickness

Sizes: 6x10, 6x12, 6x16, 6x20, 6x24, 6x30, 6x40, 6x48, 10x10, 10x12, 10x16, 10x20, 10x24, 10x30, 10x40, 10x48, 18x24, 30x40 cm in boxes and other sizes according to an agreement with manufacturer.

The vacuum-sealed packaging FOMAPAK ensures optimum contact of film surface with lead screens, simple handling, and is light-tight, airtight and waterproof.

### darkroom packaging (KB)

Sizes: 6x24, 6x40, 6x48, 10x12, 10x20, 10x24, 10x40, 10x48, 10x72, 18x24, 30x40 cm in boxes and other sizes according to an agreement with manufacturer.

### Rollfilm packaging

- rollfilm with lead screen
- bare rollfilm (BLR)

for more details see the technical data sheet of ROLLFILM

Other sizes are subject to an agreement with the manufacturer.

### Film base

INDUX R4, R5 and R7 are manufactured on a dimensionally stable bluish polyester base of 0,175 mm thickness.

### Screens

Screens-packed kinds (FOMAPAK) content lead screens 0,025 mm thick, backed by a paper of 70 - 90 g/sqm of basic weight, on both film sides.

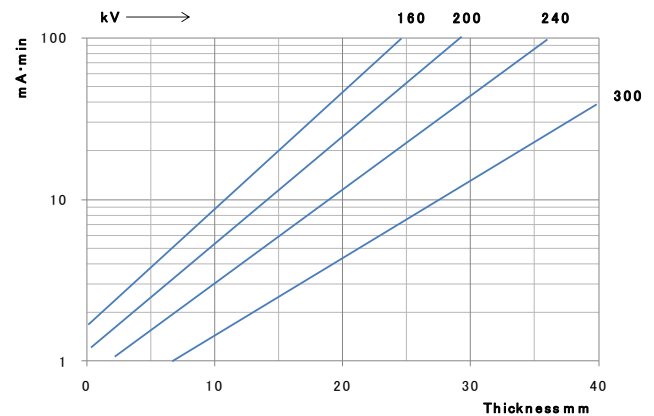
### Darkroom illumination

The film is processed at yellow-orange safety illumination with wavelength of 590 nm. Length of exposure and a distance of the processed material from the illumination source should be tested.

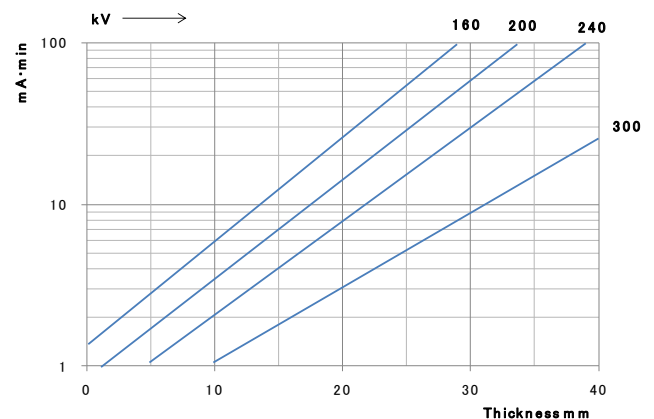
### Exposure charts for steel

For optical density  $D=2$ , front and back lead screens 0,025 mm thick, automatic processing, FOMADUX LP-D Developer, 8 minute processing cycle at 28 °C (corresponds with 2 minutes of developing time).

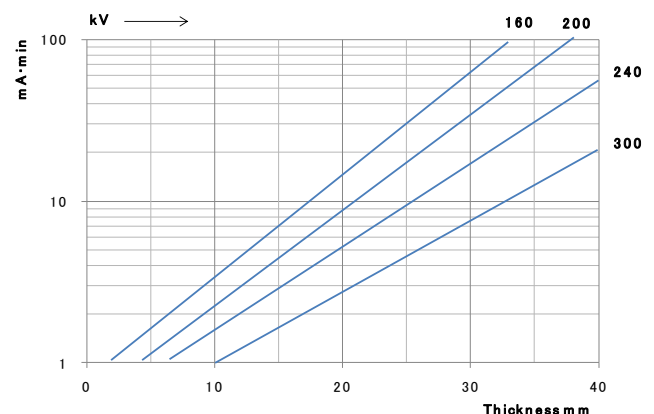
### X-rays (SFD = 100 cm) INDUX R4



### X-rays (SFD = 100 cm) INDUX R5

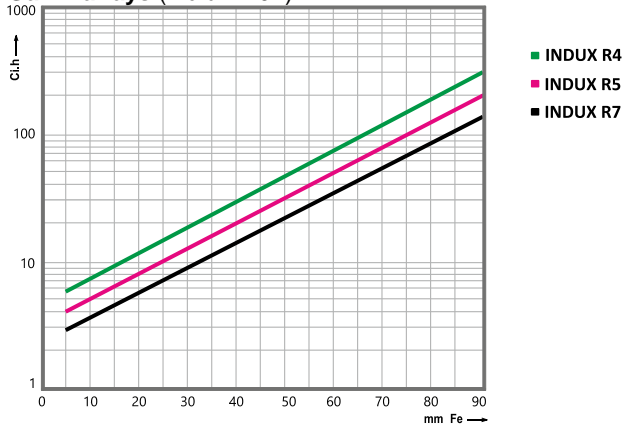


### X-rays (SFD = 100 cm) INDUX R7

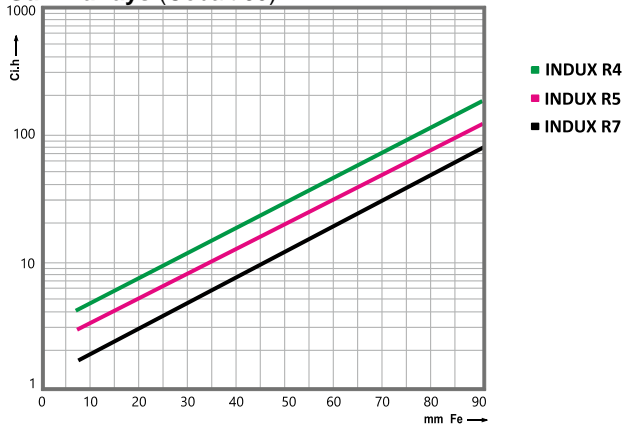




### Gamma rays (Iridium 192)



### Gamma rays (Cobalt 60)



### Processing

INDUX R4, R5 and R7 are intended both for the manual and automatic processing.

#### Recommended chemicals for the manual processing:

FOMADUX LP-T Developer  
(5 minutes of developing time at 20 °C, dilution 1 + 3)  
FOMAFIX Rapid Fixer  
FOTONAL Wetting Agent

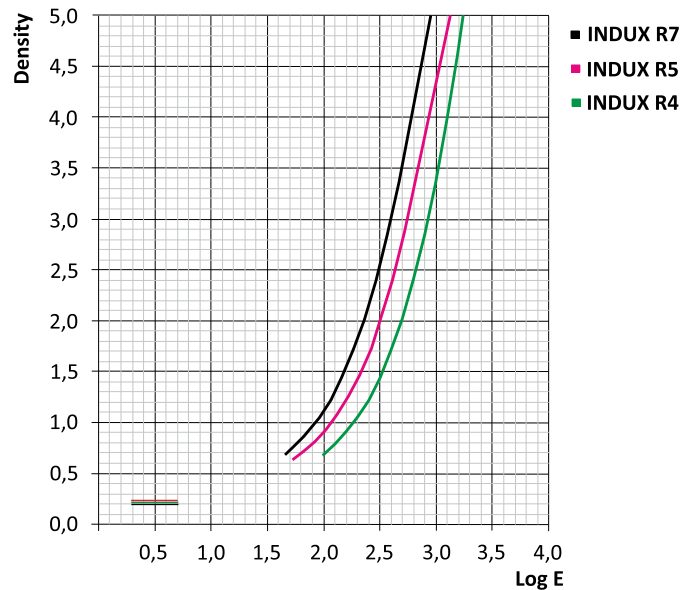
#### Recommended chemicals for the automatic processing:

FOMADUX LP-D Developer-Replenisher  
(2 minutes of developing time at 28 °C)  
FOMA LP-DS Developer Starter  
FOMADUX MIX - Hardening Fixer – part A (fixer) + part B (hardener)

FOMA industrial X-ray films INDUX R4, R5 and R7 can also be processed in FOMA ECO chemie (FOMADUX LP-ECO, FOMADUX FIX – ECO) intended for both automatic and manual processing or in corresponding processing chemicals of other manufacturers.

### Sensitometric characteristics

220 kV / 10 mA / 8 mm Cu, automatic developing, FOMADUX LP-D Developer, 8 minute processing cycle at 28 °C (corresponds with 2 minutes of developing time).



### Archiving of processed films

The manufacturer guarantees the archival permanence of minimum 50 years when complying with conditions following:

- films must be perfectly fixed and washed
- films must be stored at a relative humidity of 30 to 60% out of reach of harmful gases.

### Storage of unexposed films

Unexposed films should be stored in the vertical position in the original packaging in a cool, dry place (temperature ranging from 10 to 25 °C, relative humidity from 40 to 60 %), out of reach of harmful vapours, gases and ionizing radiations.

After opening the film bag, you must re-close it with two folds to secure it against opening. This prevents air moisture from entering the film bag.

Exposed films should be processed as soon as possible.

*By using and processing of the product Indux R4, R5 and R7 arise wastes, which is necessary to environmentally liquidate according to valid legislation.*

#### Wastes:

- packaging foil : PET / AL / PE or PAPER / PE / PAPER
- Pb foil
- waste developers
- waste fixers

Information according to Article 33 of REACH: The product INDUX contains lead. This substance is included in the list of substances (for possible inclusion in Annex XIV). After handling, hygiene rules must be followed. More information at [www.foma.cz](http://www.foma.cz)

The product has been produced and marketed in conformity with a quality system according to the international standard ISO 9001.



# ELEKTROTECHNICKÝ ZKUŠEBNÍ ÚSTAV



ELECTROTECHNICAL TESTING INSTITUTE CZECH REPUBLIC  
ELEKTROTECHNISCHE PRÜFANSTALT TSCHIECHISCHE REPUBLIK  
INSTITUT ELECTROTECHNIQUE D'ESSAIS RÉPUBLIQUE TCHÈQUE  
ELEKTROTEHNIKAIKAI HETILMATELISZABIR HIRCHITUTY NEMZOKAR PÉCEZVÁRSAGA

Pod lisem 129/2, 171 02 Praha 8 - Troja

The Electrotechnical Testing Institute Certification Body No. 3004 for certification of management systems, accredited by the Czech Accreditation Institute, o.p.s. in accordance with ČSN EN ISO/IEC 17021-1, grants the

## CERTIFICATE

No. 8180109

for the Quality Management System in accordance with

### EN ISO 9001:2015

to the Firm

## FOMA BOHEMIA spol. s r.o.

Jana Krušinky 1737/6, 500 02 Hradec Králové - Pražské Předměstí, Czech Republic

in localities:

because it ascertained that the Quality Management System of the Firm in localities and processes:

Development, production and sale of imaging and recording materials (photographic films and papers, NDT X-ray films, graphic arts and technical films and papers, recording materials, processing baths).

complies with all requirements of the above mentioned Standard documented by the Report No. 801564-02 of 16.08.2018

The validity of the Certificate is limited till: 13.09.2021

The Certified Organization is subject to annual check-ups carried out by the Certification Body. Any change within the organization concerning the certification shall be followed up and approved by the Electrotechnical Testing Institute. The validity of this Certificate may be suspended or cancelled in the event of non-compliance with the Standard on the basis of which the Certificate was issued.

Certificate granted: 14.09.2018

Praha

Mgr. Miroslav Sedišček  
Head of Certification Body



Stamp



801564-02