Automatic Processing of INDUSTREX Films

INDUSTREX Single Part Developer Replenisher

This formula is a universal, single-part concentrate used to process all types of non-destructive testing film. This liquid concentrate provides easy mixing, is compatible with existing automatic processing cycles of 8 minutes and longer, and allows a shorter processing cycle (5 minutes) for all films. The developer replenisher is designed for use in both automatic and manual processing and with all INDUSTREX Films.

This formula allows high photographic consistency and quality, and ensures efficiency when using a low replenishment rate. It also reduces any environmental impact, and reduces or minimizes operator maintenance due to crystallization, silver deposits, or sludge.

NOTE: See CHSP-8971, *Manual Processing of INDUSTREX Films,* for details regarding manual processing.

Features:

- High chemical stability—includes consistent image quality over an extended period of time, excellent resistance to aerial oxidation, and low sludge formation
- Minimal packaging, less solid waste
- Glutaraldehyde free
- Strengthened "activation power." High activity allows for fast processing and high productivity
- Outstanding image quality—cold (blue) image "tone" and low granularity
- Low environmental impact—low COD and BOD5 (5-days Biochemical Oxygen Demand)
- Concentrated (single part) liquid developer provides ease of use
- Can be used in chemical auto-mixers

INDUSTREX LO Fixer and Replenisher

This fixer is recommended to process all types of industrial imaging film in automatic and manual processing cycles. This formula consists of a single-part liquid—just add water to the proper dilution. For use, dilute the concentrate with water according to the instructions on the packaging.

You can use the INDUSTREX LO Fixer and Replenisher with all INDUSTREX Films.

Features:

- Low odor
- Good radiograph life expectancy (LE)
- Low environmental impact—low COD and BOD5 (5-days Biochemical Oxygen Demand)
- Can be used in chemical auto-mixers

Storing Solutions

To maintain product quality, these chemicals must be stored in the original unopened package, at a temperature between 5-30 °C (41-86 °F). When stored in these conditions, the lifetime is two years from the date of manufacture. Discard solutions if there is evidence of contamination, dirt, over-dilution, excessive evaporation, or crystallization.

Mixing Instructions

INDUSTREX Single Part Developer Replenisher

INDUSTREX Single Part Developer Replenisher is supplied in a quantity to prepare 38 L (2 x 19 L) or 40 L (2 x 20 L) of working solution, depending on geographic region, and consists of recyclable polyethylene containers of concentrated developer solution.

Mixing the Developer Replenisher

To Make Working Strength Solution	Start with Water at 10–30 °C (50–86 °F)	Add Concentrate (Number of Bottles)	Fill to:	Stir
19 L	10 L	1	19 L	Stir for about two minutes until a completely homogeneous solution is obtained.
20 L	10 L	1	20 L	

To mix smaller quantities, use the following table and multiply as needed:

To Make 1 L Working Strength Developer Solution:		
Start with Developer Concentrate	**Add Water at 10–30 °C (50–86 °F) to make 1 L**	**Stir**
250 mL	750 mL	Stir for about two minutes until a completely homogeneous solution is obtained.

Auto-mixer Mixing

Remove the bottle caps (leaving the seal intact) and place the bottles in the auto-mixer template. The auto-mixer will add water to achieve the proper volume or specific gravity, depending on the type/model of auto-mixer. See the packaging for details.

INDUSTREX Single Part Developer Starter

It is recommended to use the INDUSTREX Single Part Developer Starter with the INDUSTREX Single Part Developer Replenisher to prepare a developer working-strength startup solution for automatic or manual processing.

Add 31 mL of starter solution per 1 L of the mixed INDUSTREX Single Part Developer Replenisher tank solution.

Developer Tank Sizes/Starter Volume

INDUSTREX Processor	Developer Tank Volume (L)	Starter Amount (31 mL/L), CAT 835 1413
M43	13.5	418.5
M37	6.5	201.5
M37 Plus	7.5	232.5

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To Make Working Strength Solution	Start with Water at 10–30 °C (50–86 °F)	Add Concentrate (Number of Bottles), Stirring Constantly	Fill to:	Stir
19 L	10 L	1	19 L	Stir for about two minutes until a completely homogeneous solution is obtained.
20 L	10 L	1	20 L	

To mix smaller quantities, use the following table and multiply as needed:

To Make 1 L Working Strength Fixer Solution:			
Start with the Package that Makes:	**Start with Fixer Concentrate**	**Add Water at 10–30 °C (50–86 °F) to Make 1 L**	**Stir**
19 L	200 mL	800 mL	Stir for about two minutes until a completely homogeneous solution is obtained.
20 L	250 mL	750 mL	

Auto-mixer Mixing

Remove the bottle caps (leaving the seal intact) and place the bottles in the auto-mixer template. The auto-mixer will add water to achieve the proper volume or a specific gravity, depending on the type/model of the auto-mixer. See the packaging for details.

Safelight Filter

The darkroom must have suitable safelight illumination.

Use a Red Safelight Filter, such as GBX-2, with a frosted 15-watt bulb or a LED Safelight (660 nm peak) located at least 1.22 m (48 in.) from the film.

NOTE: Other safelight filters that block radiation at 550 nm and shorter wavelengths are also suitable.

Automatic Processing (Recommended)

NOTE: Observe precautionary information on product labels and on the Material Safety Data Sheets.

Cycle	Time (Minutes)	Development Time (Seconds)	Temperature
M37 Plus Processor			
Normal	8	110	28 °C (82 °F)
Short	6	90	30.5 °C (90 °F)
M43ic Processor			
Normal	8	100	26 °C (79 °F)
Short	5	70	30 °C (86 °F)

Washing

Use a filtered water supply of proper water temperature, pressure and flow. Follow the processor manufacturer's recommendation for wash flow rate.

NOTES:

- Insufficient wash flow can adversely affect the life expectancy of processed radiographs. For best results, and to prevent development of bio-slime/algae, drain the wash tank daily and leave it empty when not in use.
- Proper installation is a critical component to the success of any processor. Benefits of proper installation include:
    - Film and image quality
    - Increased productivity, e.g. less time spent on repairs
- Refer to the INDUSTREX Processor Site Specifications, especially the environmental requirements.

Drying

Follow the processor manufacturer's recommendation for dryer settings. In general, the dryer should be set to a temperature slightly above the lowest temperature required to eliminate any signs of tackiness in films exiting the dryer (3 °C/5 °F).

Replenishment

The consistency of the radiographic quality is related to the accurate adjustment of the replenishment rate. Replenishment should maintain the chemical equilibrium, replacing the components used by the film.

Replenishment Volume

Solution	Per 35 x 43 cm (14 x 17 in.) Sheet	Per m^2
Developer	100 mL	665 mL
Fixer	180 mL*	1200 mL*

*For optimum radiograph life expectancy (LE), a 10 % increase in fixer replenishment rate may be desirable.

Control of the Processing System

The processing system can be controlled by use of certified pre-exposed control strips as specified in EN ISO 11699-2 and/or ASTM E999.

NOTE: See CHSP-8983, *Using INDUSTREX Process Control Strips*, for more information.

Ensuring Process Quality - Residual Thiosulfate Test

Use a test kit to ensure good life expectancy (LE) characteristics for radiographs. A test such as the X-OMAT Hypo Estimator Test Kit (CAT 196 5847) determines whether film has been adequately washed and provides an estimate of the archival life you can expect. The kit comes complete with testing solution, eyedropper, instructions for use, and a visual Hypo Estimator.

NOTE: The data in this publication does not represent standards that must be met by Carestream. The company reserves the right to change and improve product characteristics at any time. The contents of this publication are subject to change without notice.

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Publication No. CHSP-8970, rev C

Publication History:

Previous releases: TI-2621, May 2013.

Rev 1, May 2020: Technical updates. Created in TI DB with new CHSP number.

Rev 2, Oct 2020: Added CHSP number to the header of page 1 and the footers.

Rev C, Dec 2021: Minor updates. First release into PLI (uses letter versioning).