

DRUG STABILITY GUIDE

EZ-FLOW™ Elastomeric Pumps (EZ-FLOW) offer a straightforward and secure drug delivery system suitable for nurses, pharmacists, and patients. The guidelines for utilizing the EZ-FLOW for medication administration were established based on assessments conducted by independent labs, examination of diverse medical literature, manufacturers' product details, and accessible data on drug stability pertaining to elastomeric infusion pumps.

The stability data presented in the table below pertains to the chemical stability of the tested drugs, not their sterility. This reference guide was created based on results from tests conducted by independent ISO/IEC 17025 certified laboratories, along with a review of various medical publications, including manufacturers' product information and available drug stability data for elastomeric infusion pumps.

Equivalency studies of the fluid path materials in the EPIC Medical SMARTeZ® Pump and EZ-FLOW elastomeric pumps revealed that all materials (drug reservoir membrane, tubing, and connectors) are identical, as shown by FTIR spectral analysis. This confirms that drug stability studies for these pumps will be reliably reproducible.

Medication	Concentration	Diluent	Room Temp	Refrigerated	Ref
5-FU + SODIUM FOLINATE (ONCOFOLIC + RIBOFLUOR)	5 mg/ml + 2 mg/ml	NS	7 days	--	1
	36 mg/ml + 8.8 mg/ml	NS	7 days	--	1
ACYCLOVIR NA	10 mg/ml	NS	5 days	--	6
AGALSIDASE BETA (FABRAZYME)	0.05 mg/ml	NS	24 hours	--	7
	0.7 mg/ml	NS	24 hours	--	7
AMIKACIN	10 mg/ml	NS	48 hours	15 days	7
	20 mg/ml	NS	48 hours	15 days	7
AMIKACIN SO4	10 mg/ml	NS	24 hours	28 days	4
AMOXICILLINE	1 mg/ml	NS	2 hours	6 hours	5
	40 mg/ml	NS	2 hours	6 hours	5
AMOXICILLINE + CLAVULANATE	10 mg/ml + 2 mg/ml	NS	--	6 hours	6
	20 mg/ml + 4 mg/ml	NS	--	6 hours	6
AMPICILLIN NA	12 mg/ml	NS	6 hours	4 days	8
	20 mg/ml	NS	24 hours	3 days	5
AMPICILLIN NA + SULBACTAM NA	30 mg/ml + 15 mg/ml	NS	6 hours	2 days	5
AMPOTERICIN B**	0.1 mg/ml	D5W	24 hours	4 days	1
	0.5 mg/ml	D5W	24 hours	4 days	1
	2 mg/ml	D5W	24 hours	4 days	1
AZITHROMYCIN	1 mg/ml	NS	24 hours	7 days	6
	2 mg/ml	NS	24 hours	7 days	6
AZTREONAM	10 mg/ml	NS	24 hours	7 days	4
	30 mg/ml	NS	24 hours	7 days	4

NS = Normal Saline | D5W: Glucose 5% Dextrose in Water | RTU: Ready to Use | W: Water

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**Susceptible to crystallization when refrigerated.

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BUMETANIDE	0.016 mg/ml	D5W	24 hours	--	5
	0.16 mg/ml	D5W	24 hours	--	5
BUPIVACAINE	1.25 mg/ml	NS	30 days	--	5
	7.5 mg/ml	NS	30 days	--	5
BUPIVACAINE HCL	5 mg/ml	RTU	48 hours	15 days	1
CASPOFUNGIN ACETATE	0.2 mg/ml	NS	60 hours	14 days	5
	0.5 mg/ml	NS	60 hours	14 days	5
CEFAZOLIN NA	16.7 mg/ml	NS	48 hours	14 days	1
CEFEPIME	20 mg/ml	NS	24 hours	14 days	6
CEFOTAXIME	10 mg/ml	NS	24 hours	14 days	8
	15 mg/ml	NS	24 hours	14 days	8
CEFOTAXIME NA	17 mg/ml	NS	24 hours	3 days	6
CEFOTIAM	20 mg/ml	NS/D5W	6 hours	1 day	5
CEFOXITIN	1 mg/ml	NS	48 hours	7 days	7
	10 mg/ml	NS	48 hours	7 days	7
CEFTAZIDIME	1 mg/ml	NS	24 hours	2 days	5
	40 mg/ml#	NS	12 hours	2 days	5
	40 mg/ml^	NS	24 hours	14 days	3
CEFTAZIDIME (PYRIDINE DETERMINATION)	9 mg/ml	NS	--	7 days	8
	60 mg/ml	NS	--	5 days	8
CEFTOLOZANE + TAZOBACTAM (ZERBAXA)	1 mg/ml + 0.5 mg/ml	NS	24 hours	14 days	7
	2 mg/ml + 1 mg/ml	NS	24 hours	14 days	7
	30 mg/ml + 15 mg/ml	NS	24 hours	14 days	7
CEFTRIAZONE **	10 mg/ml	NS	48 hours	14 days	7
	10 mg/ml	D5W	24 hours	6 days	1
	50 mg/ml	NS	48 hours	14 days	7
CEFUROXIME	1 mg/ml	NS	24 hours	3 days	6
	1 mg/ml	D5W	12 hours	3 days	6
	30 mg/ml	NS	24 hours	3 days	6
	30 mg/ml	D5W	12 hours	3 days	6
CIMETIDINE	1 mg/ml	NS	7 days	--	5
	6 mg/ml	NS	7 days	--	5
CIPROFLOXACIN	2 mg/ml	D5W	10 days	30 days	6
CISPLATIN *	0.1 mg/ml	NS	14 days	--	5
	0.2 mg/ml	NS	24 hours	7 days	3
	0.5 mg/ml	NS	14 days	--	5

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CLINDAMYCIN PO4	6 mg/ml	NS	3 days	30 days	6
	12 mg/ml	NS	3 days	30 days	6
CLOXACILLIN	50 mg/ml	NS	24 hours	7 days	3
COLISTIMETHATE NA	3 mg/ml	NS	2 hours	1 day	5
CYCLOPHOSPHAMIDE	2 mg/ml	NS	48 hours	14 days	5
	20 mg/ml	NS	48 hours	7 days	5
DAPTOMYCIN (CUBICIN)	1 mg/ml	NS	24 hours	10 days	7
	5 mg/ml	NS	24 hours	10 days	7
	20 mg/ml	NS	24 hours	10 days	1
DEFEROXAMINE	0.022 mg/ml	NS	48 hours	14 days	3
DEFEROXAMINE MESYLATE	5 mg/ml	NS	48 hours	14 days	1
	100 mg/ml	NS	48 hours	14 days	1
DOXORUBICIN	2 mg/ml	NS	14 days	22 days	1
DOXYCYCLINE	1 mg/ml	NS/D5W	12 hours	3 days	2
	1.5 mg/ml	NS/D5W	12 hours	3 days	2
ERAVACYCLINE	0.2 mg/ml	NS	24 hours	8 days	7
	0.6 mg/ml	NS	24 hours	8 days	7
ERTAPENEM	5 mg/ml#	NS	6 hours	24 hours	6
	5 mg/ml^	NS	--	7 days	1
	10 mg/ml^	NS	24 hours	7 days	5
	20 mg/ml#	NS	6 hours	24 hours	6
	20 mg/ml^	NS	24 hours	5 days	5
ETOPOSIDE	0.2 mg/ml	NS	4 days	--	5
	0.4 mg/ml	NS	24 hours	--	5
FERINJECT (IRON (III) SUCROSE COMPLEX)	2 mg/ml	NS	3 days	--	1
	5 mg/ml	NS	3 days	--	1
FLOXURIDINE	10 mg/ml	NS	24 hours	14 days	9
FLUCLOXACILLIN	10 mg/ml	NS	24 hours	2 days	5
	70 mg/ml	NS	24 hours	2 days	5
FLUCONAZOLE	2 mg/ml	RTU	48 hours	7 days	1
FLUOROURACIL (5FU)	5 mg/ml	D5W/NS	45 days	--	1
	50 mg/ml	RTU	45 days	--	1
FOLINIC ACID	4 mg/ml	NS	48 hours	14 days	3
FOSCARNET NA	12 mg/ml	NS	7 days	14 days	10
	24 mg/ml	RTU	7 days	14 days	10

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FOSFOMYCIN DISODIUM	16.6 mg/ml	D5W	48 hours	--	1
	40 mg/ml	D5W	48 hours	--	1
FOSFOMYCIN SODIUM	20 mg/ml	NS	24 hours	--	1
	20 mg/ml	NS	1 hour @ 37C	--	1
FUROSEMIDE	10 mg/ml	NS	4 days	7 days	2
GANCICLOVIR *	1 mg/ml	NS	48 hours	14 days	1
	1 mg/ml	D5W	48 hours	14 days	5
	10 mg/ml	NS	48 hours	14 days	1
	10 mg/ml	D5W	48 hours	14 days	5
GENTAMICIN SO4	0.5 mg/ml	NS	7 days	7 days	1
	5 mg/ml	NS	7 days	14 days	1
	10 mg/ml	NS	48 hours	28 days	13
GRANISETRON	0.02 mg/ml	NS	48 hours	7 days	5
	0.02 mg/ml	D5W	6 hours	3 days	5
	0.5 mg/ml	NS	48 hours	7 days	5
	0.5 mg/ml	D5W	6 hours	3 days	5
HUMAN PLASMA GLOBULIN	200 mg/ml	RTU	7 days	--	1
IFOSFAMIDE	0.6 mg/ml#	NS/D5W	24 hours	3 days	6
	0.6 mg/ml^	D5W	7 days	--	1
	40 mg/ml#	NS/D5W	24 hours	3 days	6
	40 mg/ml^	D5W	3 days	--	1
IMIPENEM +CILASTATIN NA	5 mg/ml + 5 mg/ml	NS	24 hours	3 days	5
IRON (III) HYDROXIDE SUCROSE	1 mg/ml	NS	24 hours	1 day	8
	2 mg/ml	NS	3 days	--	8
	5 mg/ml	NS	3 days	--	8
KETAMINE	1 mg/ml	NS	48 hours	--	6
	2 mg/ml	NS	48 hours	--	6
LEVOBUPIVACAINE	0.125%	NS	30 days	--	5
	0.750%	NS	30 days	--	5
LEVOFLOXACIN	0.5 mg/ml	NS/D5W	7 days	14 days	6
	5 mg/ml	NS/D5W	7 days	14 days	6
LIDOCAINE	0.50%	NS	30 days	--	5
	2%	NS	30 days	--	5
LINCOMYCIN	1.2 mg/ml	NS	24 hours	1 day	1
	10 mg/ml	NS/D5W	24 hours	1 day	1
LINEZOLID	0.15 mg/ml	NS	24 hours	13 days	1
	2 mg/ml	NS	24 hours	13 days	1

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MAGNESIUM SULFATE	20 mg/ml	NS	24 hours	29 days	5
MEROPENEM	2.5 mg/ml#	NS	6 hours	24 hours	6
	5 mg/ml^	NS	24 hours	10 days	5,7
	10 mg/ml	NS	21 hours	5 days	13
	20 mg/ml#	NS	24 hours	24 hours	5,6,7
	20 mg/ml^	NS	24 hours	4 days	6
METHOTREXATE	0.3 mg/ml	NS	7 days	7 days	6
	25 mg/ml	NS	7 days	7 days	6
METHYLPREDNISOLONE	10 mg/ml	NS	2 hours	7 days	2
METOCLOPRAMIDE	5 mg/ml	NS	48 hours	2 days	8
METRONIDAZOLE	5 mg/ml	RTU	24 hours	10 days	2
MICAFUNGIN	0.5 mg/ml	NS	24 hours	4 days	1
	1.5 mg/ml	NS	--	9 days	12
	2 mg/ml	NS	24 hours	4 days	1
MORPHINE SO4	1 mg/ml	NS	7 days	--	1
	20 mg/ml	NS	7 days	--	1
NAFCILLIN	5 mg/ml	NS	30 hours	14 days	7
	50 mg/ml	NS	48 hours	14 days	13
NEFOPAM	10 mg/ml	NS	24 hours	1 day	5
NORMAL SALINE	0.9% NaCl	--	15 days	15 days	5
OFLOXACIN	0.4 mg/ml	NS	7 days	14 days	5
	2 mg/ml	NS	7 days	14 days	5
OMADACYCLINE	1 mg/ml and 2 mg/ml	NS/D5W	--	9 days	8
ONDANSETRON HCL	0.03 mg/ml	NS/D5W	7 days	21 days	6
	0.7 mg/ml	N5/D5W	4 days	10 days	6
OXACILLIN	10 mg/ml	NS	4 days	8 days	6
	100 mg/ml	NS	4 days	8 days	6
PACLITAXEL	0.3 mg/ml	NS/D5W	24 hours	7 days	1
	1.2 mg/ml	NS/D5W	24 hours	7 days	1
PAMIDRONIC ACID SODIUM SALT	30 µg/ml	NS/D5W	48 hours	27 days	1
	0.4 mg/ml	NS	48 hours	27 days	1
PENICILLIN G (K)	20,000 units/ml	NS	24 hours	4 days	5
PENICILLIN G (NA)	200 units/ml	NS	2 hours	3 days	6
	100,000 units/ml#	NS	2 hours	1 day	6
	100,000 units/ml^	NS	6 hours	--	5

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PIPERACILLIN	10 mg/ml	NS	3 days	14 days	5
	80 mg/ml	NS	24 hours	5 days	5
PIPERACILLIN NA + TAZOBACTAM NA	10 mg/ml + 1.25 mg/ml#	NS	48 hours	21 days	7
	10 mg/ml + 1.25 mg/ml^	NS	24 hours	28 days	5
	80 mg/ml + 10 mg/ml#	NS	48 hours	21 days	7
	80 mg/ml + 10 mg/ml^	NS	24 hours	28 days	5
RANITIDINE	0.5 mg/ml	NS	48 hours	21 days	1
	0.5 mg/ml	D5W	48 hours	21 days	1
	2 mg/ml	NS	7 days	21 days	1
	2 mg/ml	D5W	7 days	21 days	1
RIBODRONAT (PAMIDRONIC ACID SODIUM SALT)	30 µg/ml	NS/D5W	48 hours	27 days	1
	30 µg/ml	NS	29 days	--	1
	0.4 mg/ml	NS	48 hours	27 days	1
RIFAMPICIN	0.5 mg/ml	NS	24 hours	6 days	1
	3 mg/ml	NS	24 hours	6 days	1
ROPIVACAINE	0.2 mg/ml	NS	24 hours	14 days	1
	5 mg/ml	NS	24 hours	14 days	1
	0.10%	NS	30 days	--	5
	0.75%	NS	30 days	--	5
TEICOPLANIN	1 mg/ml	NS	24 hours	7 days	5
	20 mg/ml	NS	24 hours	7 days	5
TEMOCILLIN	10 mg/ml#	NS	24 hours	14 days	5
	10 mg/ml^	NS	24 hours	--	1
	20 mg/ml#	NS	24 hours	14 days	5
	80 mg/ml^	NS	24 hours	--	1
TICARCILLIN DISODIUM CLAVULANATE K	31 mg/ml	NS	24 hours	7 days	11
TIGECYCLINE	0.5 mg/ml	NS	24 hours	2 days	1
	1 mg/ml	NS	24 hours	2 days	1
TOBRAMYCIN	0.2 mg/ml	NS	24 hours	14 days	1
	10 mg/ml	NS	24 hours	14 days	1
VANCOMYCIN	4 mg/ml#	NS/D5W	4 days	21 days	6
	15 mg/ml#	NS/D5W	48 hours	14 days	6
	15 mg/ml^	NS	48 hours	30 days	6
VENOFER (IRON (III) HYDROXIDE SUCROSE)	1 mg/ml	NS	24 hours	24 hours	1
VINCRISTINE	1 mg/ml	NS	21 days	--	5

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Source Notes:

1. *Data on File*, Integrated Medical Systems, Inc. (IMS), April 2024.
2. *Stability Data for Drugs Using B. Braun's AccuFlo™ Elastomeric Infusion System*, B.Braun Medical Inc., April 2015.
3. *Drug Stability for Easypump® II*, B.Braun Medical Inc., June 2020.
4. *Stability Data for Drugs Using Homepump Eclipse and Homepump C-Series Disposable Ambulatory Infusion System*, Halyard Health, March 2025.

Guidelines:

1. ICH (International Conference of Harmonization) Guidance on Drug Stability Study.
2. USP Chapter on Stability Studies and Good Chromatographic Practices.
3. Drug Manufacturer Product Information.
4. PDR (Physicians' Desk Reference), 60th Edition, Medical Economics Company, Oradell, NJ 2003, USA.
5. US FDA 21 CFR Part 58 (Good Laboratory Practice for Non-clinical Laboratory Studies).
6. ISO/IEC 17025 General Requirements for The Competence of Testing and Calibration Laboratories.

Laboratory Testing References:

1. Testing completed by ECOTOX Testing Service, Oldenburg, Germany.
2. Testing completed by Henkel AG & Co. KGaA, Düsseldorf, Germany.
3. Testing completed by Laboratory Faculte de Medecine et Pharmacie, France.
4. Testing completed by Philips Innovation Service, Eindhoven, Netherland.
5. Testing completed by Toxikon Europe NV, Leuven, Belgium.
6. Testing completed by SGS Life Science Services, Lincolnshire IL, U.S.A.
7. Testing completed by Nelson Labs, Leuven, Belgium.
8. Testing completed by Selvita S.A., Kraków, Poland.
9. Testing completed by TÜV SÜD PSB Pte. Ltd. Laboratory Services, Singapore, SMARTeZ Pumps (2015).
10. Testing completed by Beckman Industrial Corp., U.S.A.
11. Testing completed by Pyramid Laboratories, U.S.A.
12. Testing completed by TÜV SÜD PSB Pte. Ltd. Laboratory Services, Singapore (2023).
13. Testing completed by TÜV SÜD PSB Pte. Ltd. Laboratory Services, Singapore (2017).
14. FT-IR Analysis testing completed by TÜV SÜD PSB Pte. Ltd. Laboratory Services, Singapore, SMARTeZ®, EasyPump™ AccuFlo™ (2015).



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