

Nucleic Acid Electrophoresis



Reagents and Equipment

Electrophoresis Buffers

Reagents

Agarose Gel Media

DNA Standards

SERVA Stains for Nucleic Acids

PAGE of Nucleic Acids

Equipment

All you need for... Nucleic Acid Electrophoresis

The combination of technically sophisticated equipment with high-quality reagents delivers best results in the electrophoretic separation of nucleic acid fragments. A uniform electric field, a uniformly dissolving agarose and buffers with constantly approved specifications are best conditions for perfect separations, complemented by high-quality, ready-made markers and detection reagents.

- 
- 1 Electrophoresis Buffers
 - 2 Reagents
 - 3 Agarose Gel Media
 - 4 DNA Standards
 - 5 SERVA Stains for Nucleic Acids
 - 6 PAGE of Nucleic Acids
 - 7 Equipment

High resolution agarose, ultra-pure electrophoresis reagents and robust equipment for superior electrophoretic separation of nucleic acids

1

Electrophoresis Buffers, Ready-to-Use

SERVA's ready-to-use electrophoresis buffers save not only time but guarantee best results because they are made from high-quality reagents and application tested.

Product	Size	Cat. no.
TAE Buffer, 10x	1 L	42553.01
	10 L	42553.04
TAE Buffer, 50x, molecular biology grade	1 L	42549.01
TBE Buffer, 10x	2 x 500 ml	42557.01

2

Reagents

Reagents "electrophoresis grade" are in-house tested for electrophoresis applications. "Molecular biology grade" reagents are guaranteed DNase/RNase-free.

Product	Size	Cat. no.
Acetic acid 100 %, analytical grade	1 L	45633.01
	2,5 L	45633.02
Boric acid, electrophoresis grade	250 g	15166.01
	1 kg	15166.02
Bromophenol Blue-Na-salt	5 g	15375.01
	25 g	15375.02
Ethylenediamine tetraacetic acid-Na ₂ -salt	100 g	11280.01
	1 kg	11280.02
	5 kg	11280.03
Ethylenediamine tetraacetic acid-Na ₂ -salt, molecular biology grade	250 g	39760.01
Glycerol from plant 87 % molecular biology grade	1 L	39788.01
	500 g	37186.02
Tris(hydroxymethyl)aminomethane, molecular biology grade	1 kg	37186.03
	2,5 kg	37186.04
	500 g	37181.01
Tris(hydroxymethyl)aminomethane, electrophoresis grade	1 kg	37181.02
	2,5 kg	37181.03
	500 g	35579.02
Sucrose, analytical grade	5 kg	35579.03
	25 kg	35579.04

Ready-to-use solutions for saving time and work

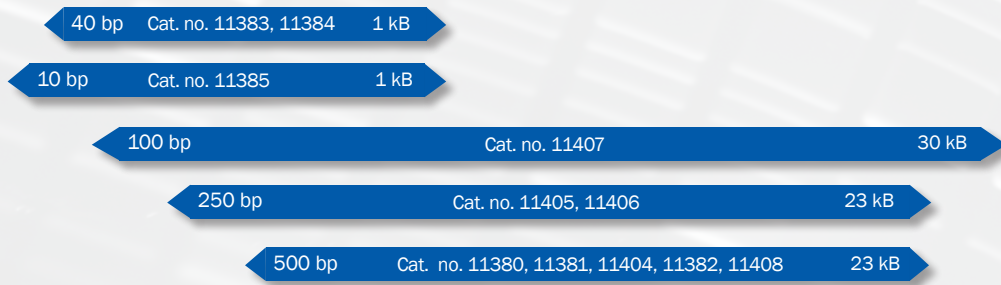
Application tested for best results in electrophoresis

3 Agarose Gel Media

Agarose is a highly purified naturally occurring polysaccharide. Preparation of agarose gels involves simply heating the powdered agarose in buffer to dissolve it. It gels upon cooling. Like acrylamide, the pore size of an agarose gel is inversely dependent on the agarose concentration. The pores in agarose gels are generally much larger than those in acrylamide gels and are widely used in separation of nucleic acids.

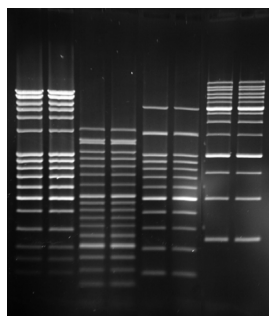
There are many different types of agarose available. The best choice for routine DNA electrophoresis is Agarose SERVA Wide Range (cat. no. 11406) or Agarose for DNA electrophoresis (cat. no. 11404). This offers good gel strength and low impurities that might interfere with subsequent procedures. Other qualities like Agarose SERVA for PCR (cat. no. 11383) and Agarose SERVA 3:1 (cat. no. 11385) are made for efficient separation of small DNA fragments <1000 bp.

Separation ranges of SERVA agaroses

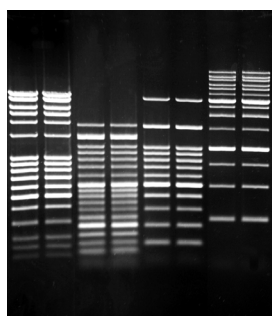


Agarose	Routine analysis	High resolution <1000 bp	Cloning	In-Gel applications	Gene technology grade	DNA/RNA recovery	Blotting
Agarose SERVA	✓						✓
Agarose SERVA low melting			✓	✓		✓	
Agarose SERVA for DNA electrophoresis	✓		✓				✓
Agarose SERVA Wide Range	✓		✓				✓
Agarose SERVA Premium			✓		✓	✓	✓
Agarose SERVA Premium low melting			✓	✓	✓	✓	
Agarose SERVA 3:1		✓	✓				✓
Agarose SERVA for PCR		✓	✓		✓	✓	✓
Agarose SERVA for PCR low melting		✓	✓	✓	✓	✓	
Agarose SERVA FastSolve tablets	✓		✓			✓	✓
Agarose SERVA tablets			✓		✓	✓	✓

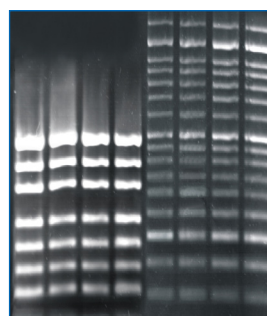
Product	Size	Cat. no.
Agarose SERVA	25 g	11380.01
	100 g	11380.02
	250 g	11380.03
	500 g	11380.05
Agarose SERVA low melting	5 g	11408.01
	25 g	11408.02
Agarose SERVA for DNA electrophoresis	100 g	11404.03
	250 g	11404.04
	500 g	11404.07
	1 kg	11404.05
Agarose SERVA Wide Range	250 g	11406.01
	500 g	11406.02
	1 kg	11406.03
Agarose SERVA Premium	100 g	11381.02
	250 g	11381.03
Agarose SERVA Premium low melting	25 g	11382.01
	100 g	11382.02
Agarose SERVA 3:1	25 g	11385.01
	100 g	11385.02
Agarose SERVA for PCR	25 g	11383.01
	100 g	11383.02
Agarose SERVA for PCR low melting	25 g	11384.01
	100 g	11384.02
Agarose SERVA FastSolve tablets, 0.5 g/tablet	200 tablets	11407.01
Agarose SERVA tablets, 0.5 g/tablet	100 g	11405.01
	500 g	11405.02



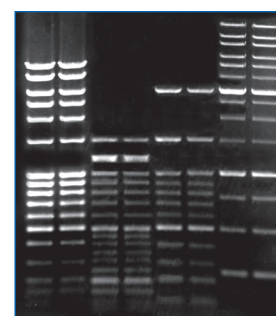
Agarose SERVA
Wide Range



Agarose SERVA
Premium



Agarose SERVA 3:1



Agarose SERVA
FastSolve tablets

4

DNA Standards

SERVA offers two types of DNA molecular weight size markers.

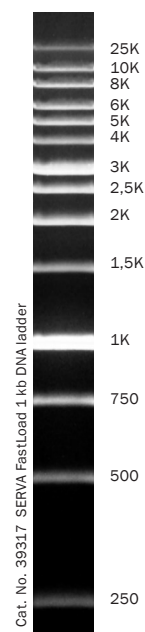
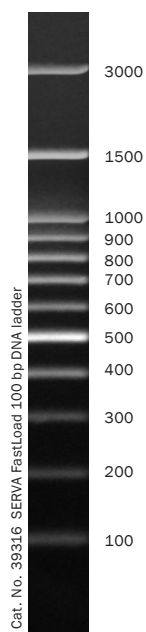
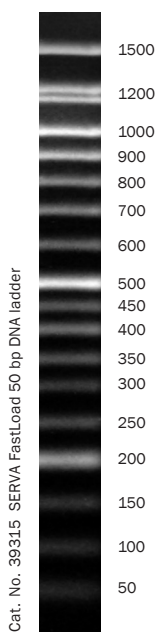
SERVA FastLoad DNA Ladders are ready-to-use DNA ladders for fragment ranges from 50 – 1500 bp, 100 – 3000 bp and 250 bp – 25 Kbp. SERVA DNA standards

lyophilized consist of a range of lyophilized DNA molecular weight standards covering traditional MW standards made by digestion of pUC19, pBR328 or phage λ DNA as well as 100 bp and 1 Kbp ladders for PCR fragment analysis.

SERVA FastLoad DNA ladder

- Supplied in loading buffer
- The approximate mass of each band is indicated - easy mass estimation of DNA bands
- Can be stored for 6 months at 25 °C or for 12 months at 4 °C (long time storage at -20 °C)

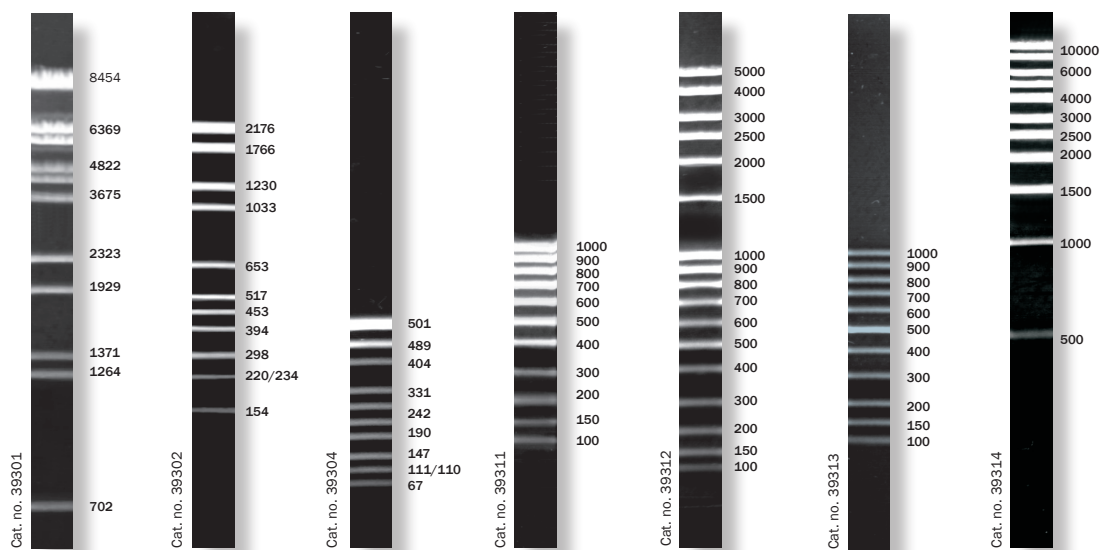
Description	DNA fragments	Fragment range	Load per lane	Size	Cat. no.
50 bp DNA ladder	17	50 - 1500 bp 200 and 500 bp with increased intensity	5 μ l (0.56 μ g)	500 μ l	39315.01
100 bp DNA ladder	12	100 - 3000 bp 500 and 1500 bp with increased intensity	5 μ l (0.54 μ g)	500 μ l	39316.01
1 kb DNA ladder	14	250 bp – 25 kb, 3000 and 1000 bp with increased intensity	5 μ l (0.52 μ g)	500 μ l	39317.01



SERVA DNA standards lyophilized

- High-quality fragment ends, lyophilized - can be resuspended in buffer of choice, for e.g. fill-in, 5'-end label
- 1 x 1 ml sample buffer is included for easy and fast resuspension of the DNA fragments
- Equimolar ladder for easy quantification
- Equalized ladder for same staining intensities of bands

Description	DNA fragments	Load per lane	Size	Cat. no.
Lambda x BstEII	14	0.8 – 1.0 µg	2x 50 µg	39301.01
pUC19 x MspI	12	0.7 – 1.0 µg	50 µg	39304.01
100 bp ladder equimolar	11	0.7 – 1.0 µg	50 µg	39311.01
100 bp ladder extended	17	0.8 – 1.0 µg	50 µg	39312.01
100 bp ladder equalized	11	0.2 – 0.3 µg	20 µg	39313.01
1 Kbp ladder	11	0.5 – 0.7 µg	4x 50 µg	39314.01



For size determination of DNA fragments in agarose gels you need size markers of high quality under the respect of fragment size and purity

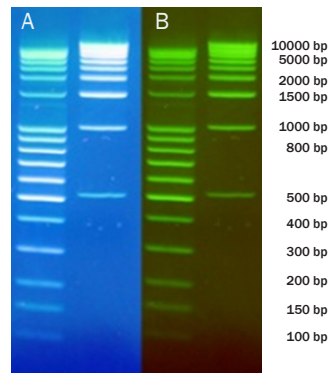
SERVA Stains for Nucleic Acids

Besides the classical stain for agarose gels ethidium bromide SERVA offers a safe, non-carcinogenic alternative: SERVA DNA Stain G and SERVA DNA Stain Clear G. They are at least as sensitive as ethidium bromide and can be used in exactly the same way in agarose gel electrophoresis.

SERVA DNA Stain Clear G gives a very low background and has therefore a higher sensitivity as SERVA DNA Stain G. It has two secondary fluorescence excitation peaks (ca. 270 nm and 295 nm) and one strong excitation peak centered around 490 nm. Working dilution is 1:17,000 to 1:25,000.

The dyes emit a green fluorescence when bound to DNA or RNA. The fluorescence emission is similar to EtBr at ca. 530 nm when bound to nucleic acid. Pre- and post-staining is possible. The post-staining solution is reusable 2 – 3 times.

SERVA DNA Stain G has one fluorescence excitation maximum at ca. 300 nm and another at ca. 450 nm when bound to nucleic acid. Working dilution is 1:20,000 to 1:50,000.



DNA samples were separated in a 1.5 % agarose gel. For pre-staining the dye was diluted 1:25,000. The staining was visualized using a transilluminator at 312 nm.

Lane 1: SERVA DNA Standard 100 Bp ladder extended, cat. no. 39312.

Lane 2: SERVA DNA Standard 1Kbp DNA ladder, cat. no. 39314

Agarose SERVA for DNA Electrophoresis, cat. no. 11404; BlueMarine™ 100, cat. no. BM 100; 35 min, 150 V.

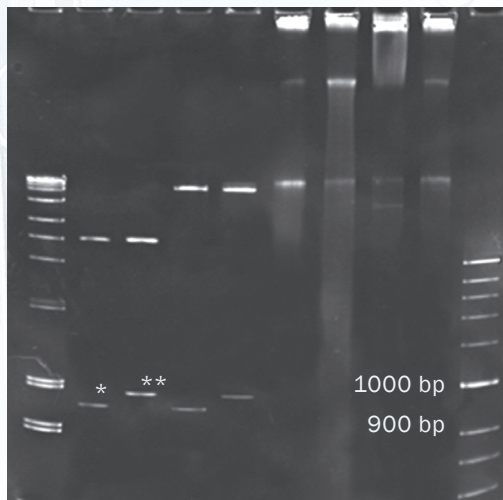
A: without orange filter; B: with orange filter.

Product	Size	Cat. no.
Ethidium bromide aqueous solution, 1 % w/v	25 ml	21251.01
Ethidium bromide, research grade	1 g	21238.01
	5 g	21238.02
SERVA DNA Stain G	1 ml	39803.01
	5 x 1 ml	39803.02
SERVA DNA Stain Clear G	1 ml	39804.01
	5 x 1 ml	39804.02

PAGE of nucleic acids

The most often used DNA separation methods applies agarose gels. In polyacrylamide gel electrophoresis (PAGE), the nucleic acids are retarded by a molecular mass-dependent chain-matrix interaction that occurs in addition to sieving. This results in a high resolution especially for

small and linear fragments (<500 bp). Furthermore, gradient polyacrylamide gels are available to adjust the right separation distance even better. Hence, PAGE of nucleic acids is an alternative to agarose gels for PCR check, small sized nucleic acids or separating overlapping double-bands.



DNA separation on SERVAGE™ TG PRiME™ 8 % (cat. no. 43264) using SERVA PRiME™ DNA Sample Buffer (cat. no. 42544) and TBE Running Buffer (cat. no. 42557).

Conditions: 10 min 150 V, 75 min 250 V. Staining: SERVA DNA Stain Clear G (cat. no. 39804). Lane 2-5: PRiME resolution of 30 bp difference between * and **.

Kindly provided by Henrike Miess, Pharmazeutisches Institut, Eberhard-Karls-Universität Tübingen

SERVAGE™ TG PRiME™	15 sample wells	12 sample wells	10 sample wells	Size
8 %	43284.01	43260.01	43261.01	10 gels
10 %	43285.01	43263.01	43264.01	10 gels
12 %	43286.01	43266.01	43267.01	10 gels
14 %	43287.01	43269.01	43270.01	10 gels
4-12 %	43288.01	43273.01	43274.01	10 gels
4-20 %	43289.01	43276.01	43277.01	10 gels
8-16 %	43290.01	43279.01	43280.01	10 gels

- Easy, safe and reproducible
- High resolution, razor sharp bands
- PCR check, small size nucleic acid separations

7

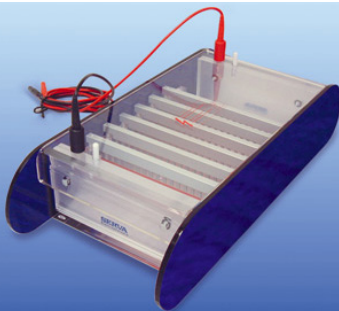
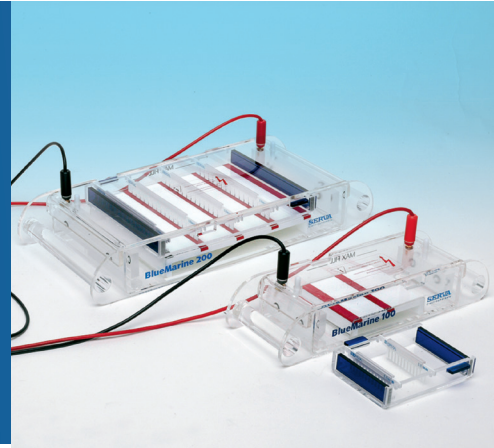
Equipment for Nucleic Acid Electrophoresis

Not only the quality of the used agarose media and reagents is crucial to achieve best results in the electrophoretic separation of nucleic acid fragments. Only the use of submarine electrophoresis chambers providing a uniform electric field during the run and a reliable power supply will result in perfect separations.

BlueMarine™ 100/200

Robust, acrylic submarine chambers. BM 100: Gel format 7 x 10 cm for quick analysis of up to 28 samples. Contains main unit, 1 removable UV transparent gel tray (7 x 10 cm), 2 gel casting gates, 1 comb (1.0 mm, 8 samples).

BM 200: Gel formats 15 x 15 cm or 15 x 20 cm for best resolution or high throughput analysis. Contains main unit, 2 removable UV transparent gel trays (15 x 15 cm, 15 x 20 cm), 2 gel casting gates, 2 combs (1.0 mm, 16 samples).



BlueMarine™ HTS

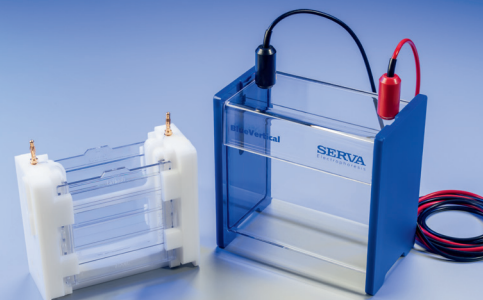
Innovative system for high-throughput analysis. Includes 6 aluminium combs with 17 sample wells each. Includes 2 gel casting gates for

leak-free gel casting. For 102 samples, separation distance max. 6 cm. For long runs of 17 single samples, distance max. 18 cm.

BlueVertical™ PRiME™

The BlueVertical™ PRiME™ system has been developed to run precast gels in 1D SDS PAGE, but also for nucleic acid PAGE applications. The

unique innovative clamp system keeps the gel cassettes in their correct position at the inner core running module, leak-free and ready to start within seconds.



Product	Size	Cat. no.
BlueMarine™ 100	1 unit	BM 100
BlueMarine™ 200	1 unit	BM 200
BlueMarine™ HTS	1 unit	BM HTS
BlueVertical™ PRiME™	1 unit	BV 104



MP 310 Power Supply

MP 310 power supply with full control (like agarose gel electrophoresis, range of designated current and/or voltage. Its maximum voltage output is 300 V. It is capable of running horizontal and vertical electrophoresis (like nucleic acid PAGE, SDS PAGE). The compact design of stackability is another feature to save benchtop space.

Digital Imaging and Analysis System III

The Digital Imaging and Analysis System III is the ideal solution to master the daily tasks of documentation and 1D gel analysis in routine laboratory work. Solid hardware including a digital SLR camera and easy-to-grasp 1D analysis software are combined to provide an excellent tool to meet your needs. UV-, blue- and white-light transilluminator or epi-white light are optional.



SERVA Blue-White Light Table

The SERVA Blue-White Light Table is a blue/white light LED transilluminator for the detection of nucleic acids or proteins under non-UV condition, there is no need for any special personal eye or skin protection. Capture the gel image with your smartphone, mini darkroom chamber included!

SERVA BlueCube 300/300L

The SERVA BlueCube 300 is a small and compact documentation system for capturing SERVA DNA Stain Clear G and EtBr stained nucleic acids separated in agarose and acrylamide gels. It is equipped with a CMOS sensor, a two filter system, a UV filter (Ø 25 mm) and a UV table drawer (312 nm, filter size is 180 x 140 mm).

An external computer (only included with "-L"-version) is connected via USB. A gel capture and 1D analysis software comes with the system for fast and easy going analysis of the captured gel, including automatic band detection, determination of molecular weights and quantification of bands.



Product	Size	Cat. no.
MP 310 Power Supply	1 unit	MP-310
Digital Imaging and Analysis System III, basic	1 system	DIAS-III-B
Digital Imaging and Analysis System III plus GelScan 6.0	1 system	DIAS-III
Digital Imaging and Analysis System III plus LabImage 1D L-340	1 system	DIAS-III-L
SERVA Blue-White Light Table	1 unit	BWL-T
SERVA BlueCube 300	1 unit	BC-300
SERVA BlueCube 300L	1 system	BC-300L



SERVA WORLDWIDE
www.serva.de

SERVA Electrophoresis GmbH
Carl-Benz-Str. 7
69115 Heidelberg / Germany
Fon: +49 6221 13840-0
Fax: +49 6221 13840-10
E-mail: info@serva.de · www.serva.de

