Your One-Stop-Shop
for Molecular Biology

- Standard & Real-Time PCR
- Primers & Oligonucleotides
- DNA Mutagenesis & Preparation
- DNA Labeling
- Restriction & Modifying Enzymes

Jena Bioscience
www.jenabioscience.com

Jena Bioscience
Company Profile

Jena Bioscience GmbH was founded by a team of scientists from the Max-Planck-Institute for Molecular Physiology in Dortmund. 25+ years of academic know how were condensed into the company in order to develop innovative reagents and technologies for the life science market.

Since the start up in 1998, the company has evolved into an established global reagent supplier with more than 3000 products on stock and a customer base in 40+ countries. Jena Bioscience serves three major client groups:

- **Research laboratories at universities, industry, government, hospitals and medical schools**
- **Pharmaceutical industry in the process from lead discovery through to pre-clinical stages**
- **Laboratory & diagnostic reagent kit producers and re-sellers**

Our company premises are located in the city of Jena / Germany with a subsidiary in Teltow, just in the vicinity of the German capital Berlin.

Jena Bioscience's products include nucleotides and their non-natural analogs, recombinant proteins & protein production systems, reagents for the crystallization of biological macromolecules and tailor-made solutions for molecular biology and biochemistry.

In our chemistry division, we have hundreds of natural and modified nucleotides available on stock. In addition, with our pre-made building blocks and in-house expertise we manufacture even the most exotic nucleotide analog from mg...kg scale.
In the field of recombinant protein production, Jena Bioscience has developed its proprietary LEXSY technology. LEXSY (Leishmania Expression System) is based on a S1-classified unicellular organism that combines easy handling with a full eukaryotic protein folding and modification machinery including mammalian-like glycosylation. LEXSY is primarily used for the expression of proteins that are expressed at low yields or inactive in the established systems, and expression levels of 300 mg/L of culture were achieved.

For the crystallization of biological macromolecules – which is the bottle neck in determining the 3D-structure of any protein – we offer specialized reagents for crystal screening, crystal optimization and phasing that can reduce the time for obtaining high quality crystals ready for X-ray diffraction from several years to a few days.

Our specialized reagents are complemented with a large selection of products for any molecular biology & biochemistry laboratory such as kits for Standard PCR and Real-Time PCR, oligonucleotides, cloning enzymes, mutagenesis technologies, and many more...

We combine highest quality standards for all our products with an individualized customer support. We establish direct lines of communication from clients to our in-house scientists, resulting in productive interactions among people with similar background and research interest who speak the same language. Furthermore, we offer support programs and attractive discount schemes for young scientists establishing their own labs. If you wish to receive more information on Jena Bioscience, just send us an e-mail to **info@jenabioscience.com**.



Table of Contents

Standard PCR – Product Selection Guide

Tailor-made solutions for a broad range of applications

Product	Cat.-Nr.	Convenience	Yield	Specificity	
Ready-to-Use Mixes / direct gel loading					
Red Load Taq Master	PCR-108	++++	++	++	
Red Load Taq Master / high yield	PCR-106	++++	+++	+	
Red Load Hot Start Master	PCR-109	++++	++	+++	
Ready-to-Use Mixes					
Taq Master	PCR-102	+++	++	++	
Taq Master / high yield	PCR-101	+++	+++	+	
Hot Start Master	PCR-103	+++	++	+++	
High Fidelity Master	PCR-104	+++	+++	++	
Core Kits					
Taq Core Kit	PCR-232	++	++	++	
Taq Core Kit / high yield	PCR-231	++	+++	+	
Hot Start Core Kit	PCR-233	++	++	+++	
High Fidelity Core Kit	PCR-234	++	+++	++	
Pfu-X Core Kit	PCR-237	++	++	++	
Thermophilic Polymerases					
Taq Pol	PCR-202	+	++	++	
Taq Pol / high yield	PCR-201	+	+++	+	
Hot Start Pol	PCR-203	+	++	+++	
High Fidelity Pol	PCR-204	+	+++	++	
Pfu-X Polymerase	PCR-207	+	++	++	
Sequencing Pol	PCR-206	+	++	++	
Ready-to-Use Lyophilisates					
Red Load Taq Master Lyophilisate	PCR-151	+++++	++	++	
Taq Master Lyophilisate	PCR-152	++++	++	++	
Hot Start Master Lyophilisate	PCR-153	++++	++	+++	
Supplements					
PCR Additives Kit	PCR-252	++	+++	++	
PCR Control Kit	PCR-253	+++	–	–	
dNTP PCR Mix GCamplifier	PCR-257	++	–	–	
Gel Loading Buffer	PCR-254	–	–	–	

	Fidelity	Application
	+	• Routine PCR / optimized for minimal by-product formation • Plate based PCR and automated pipetting
	+	• Routine PCR / optimized for high efficiency in a broad range of reaction conditions • Not recommended for plate based PCR and automated pipetting
	+	• High specificity PCR / high sensitivity PCR • Plate based PCR and automated pipetting
	+	• Routine PCR / optimized for minimal by-product formation • Plate based PCR and automated pipetting
	+	• Routine PCR / optimized for high efficiency in a broad range of reaction conditions • Not recommended for plate based PCR and automated pipetting
	+	• High specificity PCR / high sensitivity PCR • Plate based PCR and automated pipetting
	++	• High fidelity PCR • Amplification of GC-rich and other difficult templates
	+	• Routine PCR / optimized for minimal by-product formation • Plate based PCR and automated pipetting
	+	• Routine PCR / optimized for high efficiency in a broad range of reaction conditions • Not recommended for plate based PCR and automated pipetting
	+	• High specificity PCR / high sensitivity PCR • Plate based PCR and automated pipetting
	++	• High fidelity PCR • Amplification of very long templates up to 30 kb, GC-rich and other difficult templates
	+++	• Efficient amplification with highest fidelity • Engineered Pfu polymerase with higher accuracy and increased processivity
	+	• Routine PCR / optimized for minimal by-product formation • Plate based PCR and automated pipetting
	+	• Routine PCR / optimized for high efficiency in a broad range of reaction conditions • Incorporation of labeled or other modified nucleotides
	+	• High specificity PCR / high sensitivity PCR • Plate based PCR and automated pipetting
	++	• High fidelity PCR • Amplification of very long templates up to 30 kb, GC-rich and other difficult templates
	+++	• Efficient amplification with highest fidelity • Engineered Pfu polymerase with higher accuracy and increased processivity
	+	• Incorporation of ddNTPs and dNTPs at equal rates • DNA sequencing
	+	• Preloaded tubes and plates for routine PCR, stable at room temperature • Direct loading of the PCR product onto the gel
	+	• Preloaded tubes and plates for routine PCR • Stable at room temperature
	+	• Preloaded tubes and plates for high specificity / high sensitivity PCR • Stable at room temperature
	–	• Enhancer for GC-rich and other difficult templates • Taq Stabilizer to increase amplification yield
	–	• Quality and benchmark tests / positive control of PCR reactions / internal lab standard • Includes primer and template for amplification of the β-actin gene from human DNA
	–	• Amplification of GC-rich DNA templates • Used instead of standard dNTP mix
	–	• Facilitates loading of DNA containing samples into wells of agarose and polyacrylamide gels • Available in different dye combination as blue, green and orange loading buffer

Ready-to-Use Mixes for Maximum Convenience

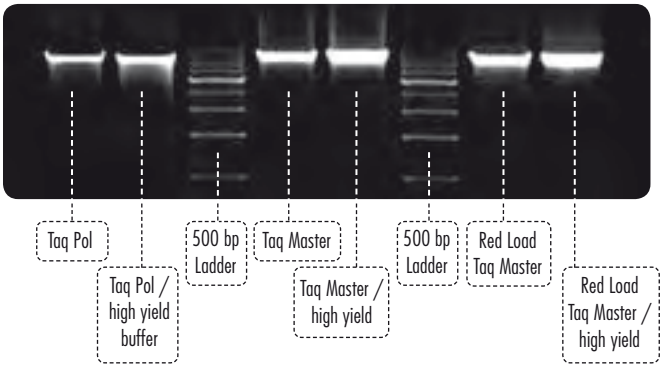
Ready-to-Use Mixes for direct gel loading contain an inherent red dye and allow the direct loading of the PCR product onto an agarose or acrylamide gel. The Taq Master mixes are recommended for use in routine PCR and ensure fast and easy preparation with a minimum of pipetting steps. The Hot Start Master is based on a heat-activatable Taq polymerase for high specificity applications. The mixes contain all reagents required for PCR (except template and primer) in a premixed 5× concentrated solution.

Ready-to-Use Mixes / direct gel loading			
Red Load Taq Master Taq master mix for direct gel loading	PCR-108S	100 reactions	45 €
	PCR-108L	500 reactions	180 €
Red Load Taq Master / high yield Taq master mix for direct gel loading	PCR-106S	100 reactions	45 €
	PCR-106L	500 reactions	180 €
Red Load Hot Start Master Hot start master mix for direct gel loading	PCR-109S	100 reactions	90 €
	PCR-109L	500 reactions	360 €

Ready-to-Use Mixes are convenient premixes containing all reagents required for PCR (except template and primer) in a premixed 5× concentrated solution. Premium quality enzymes and dNTPs ensure the highest quality of amplification results.

Ready-to-Use Mixes			
Taq Master Master mix of thermostable DNA polymerase	PCR-102S	100 reactions	40 €
	PCR-102L	500 reactions	160 €
Taq Master / high yield Master mix of thermostable DNA polymerase	PCR-101S	100 reactions	40 €
	PCR-101L	500 reactions	160 €
Hot Start Master Master mix of heat-activatable DNA polymerase for high specificity	PCR-103S	100 reactions	80 €
	PCR-103L	500 reactions	320 €
High Fidelity Master Master mix of thermostable DNA polymerase for high accuracy	PCR-104S	50 reactions	55 €
	PCR-104L	250 reactions	220 €

Taq Pol Master Mixes allow efficient amplification of long fragments
PCR from Lambda phage DNA, 4 kbp fragment



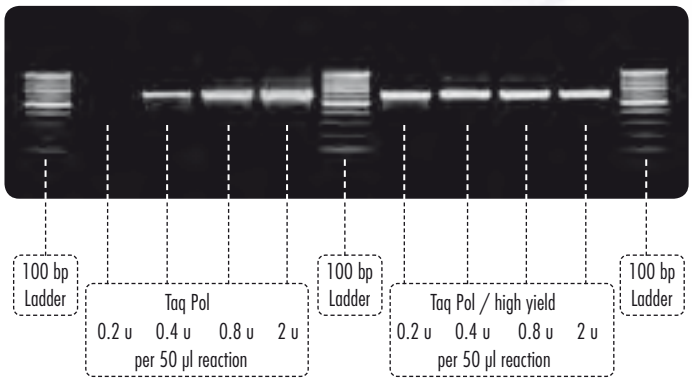
Core Kits – Complete sets of reagents required for PCR

Jena Bioscience Core Kits provide you with premium quality enzymes, ultrapure dNTPs and optimized reaction buffers. Each kit contains complete reaction buffer with $MgCl_2$ ensuring superior results in a broad range of reaction conditions or template-primer combinations. The additional reaction buffer without $MgCl_2$ in combination with the $MgCl_2$ stock solution allows the optimization of magnesium-sensitive PCR reactions. The kit combines simple handling with high flexibility.

Core Kits			
Taq Core Kit Kit of thermostable DNA polymerase, dNTPs and reaction buffer	PCR-232S	200 units	48 €
	PCR-232L	1000 units	192 €
Taq Core Kit / high yield Kit of thermostable DNA polymerase, dNTPs and high yield buffer	PCR-231S	200 units	48 €
	PCR-231L	1000 units	192 €
Hot Start Core Kit Kit of heat-activatable DNA polymerase for high specificity, dNTPs and hot start buffer	PCR-233S	200 units	83 €
	PCR-233L	1000 units	332 €
High Fidelity Core Kit Kit of thermostable DNA polymerase for high accuracy, dNTPs and high fidelity buffer	PCR-234S	100 units	56 €
	PCR-234L	500 units	224 €
Pfu-X Core Kit Kit of proofreading DNA polymerase for highest accuracy dNTPs and reaction buffer	PCR-237S	100 units	68 €
	PCR-237L	500 units	272 €

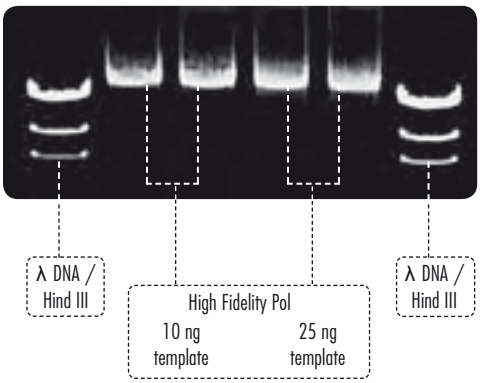
Taq Pol shows excellent amplification at low concentrations

Human EPO-gene, 560 bp fragment

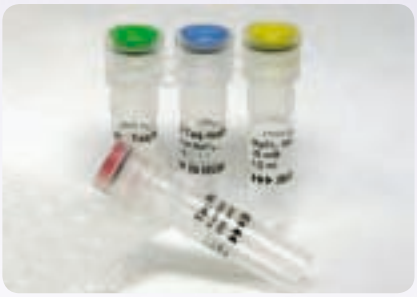


High Fidelity Pol allows efficient amplification of extremely long templates

Lambda DNA, 30 kbp fragment



Thermophilic Polymerases for Maximum Flexibility



Jena Bioscience offers a broad range of optimized **Thermophilic Polymerases**. Make your selection from Taq polymerases for routine PCR applications, hot start polymerases for high specific amplifications or proofreading enzyme blends for high fidelity and long range PCR. All enzymes ensure reliable, high performance results and guarantee maximum success for their particular application.

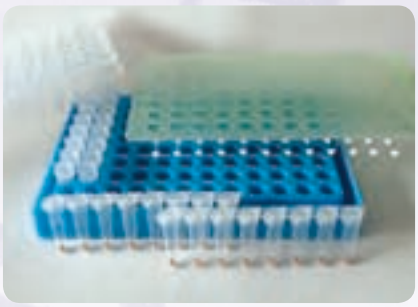
Thermophilic Polymerases			
Taq Pol Thermostable DNA polymerase	PCR-202S	200 units	35 €
	PCR-202L	1000 units	140 €
Taq Pol / high yield Thermostable DNA polymerase	PCR-201S	200 units	35 €
	PCR-201L	1000 units	140 €
Hot Start Pol Heat-activatable DNA polymerase for high specificity	PCR-203S	200 units	70 €
	PCR-203L	1000 units	280 €
High Fidelity Pol Thermostable DNA polymerase for high accuracy	PCR-204S	100 units	48 €
	PCR-204L	500 units	192 €
Pfu-X Polymerase Proofreading DNA polymerase for highest accuracy	PCR-207S	100 units	60 €
	PCR-207L	500 units	240 €
Sequencing Pol Taq Pol mutant for incorporation of ddNTPs	PCR-206S	200 units	70 €
	PCR-206L	1000 units	280 €

Supplements

Standard PCR Supplements are convenient tools for routine applications or optimization of difficult primer-template combinations. They are recommended to facilitate the amplification of GC-rich structures, to enhance the yield or to serve as an internal lab standard.

Supplements			
Gel Loading Buffer with DNA Stain Loading buffer for agarose or polyacrylamide gels with EvaGreen™ fluorescent DNA stain	PCR-255	5×1 ml	35 €
Gel Loading Buffer Loading buffer for agarose or polyacrylamide gels	PCR-254	5×1 ml	25 €
EvaGreen™ Fluorescent Gel Stain Staining dye for DNA gel electrophoresis	PCR-256	100 µl	40 €
PCR Control Kit Amplification of a beta-actin gene fragment from human genomic DNA	PCR-253	500 reactions	50 €
dNTP PCR Mix GCamplifier Modified dNTP mix for amplification of GC-rich sequences	PCR-257	100 µl	80 €
PCR Additives Kit Stabilizer and enhancer	PCR-252	500 reactions	40 €

Lyophilisates – Preloaded and Stable at Room Temperature



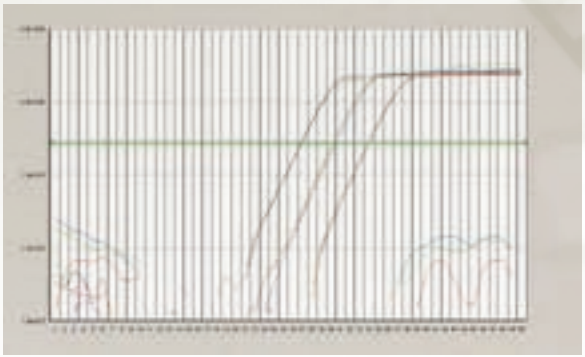
Ready-to-Use Lyophilisates are deliverd in PCR reaction tube strips or 96-well plates preloaded with a complete master mix in a dry, room temperature stable format. The lyophilisates combine highest performance with convenience of use and stability. There is no need for freezing, thawing or pipetting on ice. The few remaining pipetting steps minimize the risk of errors or contaminations. Each vial contains polymerase, dNTPs and reaction buffer required for a 20 µl PCR assay. The Red Load Taq Master Lyophilisate contains additionally an inherent red dye allowing the direct loading of the PCR reaction product onto the gel. Simply fill up the vials with template DNA, primer and PCR-grade water and run the PCR in a thermocycler as usual.

Ready-to-Use Lyophilisates				
Red Load Taq Master Lyophilisate Lyophilized Taq master mix containing red gel loading dye	preloaded 8-tube strips	PCR-151S-8TS	12 strips / 96 reactions	90 €
		PCR-151L-8TS	60 strips / 480 reactions	360 €
	preloaded 96-well plates (flat top, without skirt)	PCR-151S-FTP	2 plates / 192 reactions	135 €
		PCR-151L-FTP	10 plates / 960 reactions	540 €
	preloaded 96-well plates (half skirt)	PCR-151S-HSP	2 plates / 192 reactions	135 €
		PCR-151L-HSP	10 plates / 960 reactions	540 €
Taq Master Lyophilisate Lyophilized Taq master mix	preloaded 8-tube strips	PCR-152S-8TS	12 strips / 96 reactions	90 €
		PCR-152L-8TS	60 strips / 480 reactions	360 €
	preloaded 96-well plates (flat top, without skirt)	PCR-152S-FTP	2 plates / 192 reactions	135 €
		PCR-152L-FTP	10 plates / 960 reactions	540 €
	preloaded 96-well plates (half skirt)	PCR-152S-HSP	2 plates / 192 reactions	135 €
		PCR-152L-HSP	10 plates / 960 reactions	540 €
Hot Start Master Lyophilisate Lyophilized hot start master mix	preloaded 8-tube strips	PCR-153S-8TS	12 strips / 96 reactions	120 €
		PCR-153L-8TS	60 strips / 480 reactions	480 €
	preloaded 96-well plates (flat top, without skirt)	PCR-153S-FTP	2 plates / 192 reactions	180 €
		PCR-153L-FTP	10 plates / 960 reactions	720 €
	preloaded 96-well plates (half skirt)	PCR-153S-HSP	2 plates / 192 reactions	180 €
		PCR-153L-HSP	10 plates / 960 reactions	720 €

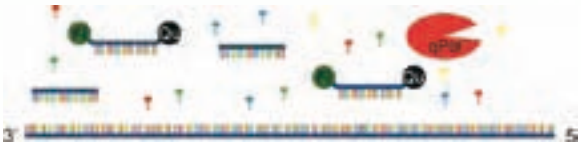
Ready-to-Use Lyophilisates containing primers are custom made master mix lyophilisates comprising primers, polymerase, dNTPs and reaction buffer. Provide us with primer sequence and we deliver preloaded PCR tubes and plates ready-made for your special application. The only thing you still have to do is adding template DNA, filling up with water and starting the cycler!

Ready-to-Use Lyophilisates containing primers		
Red Load Taq Master Lyophilisate containing custom primers	preloaded 8-tube strips and 96-well plates	please inquire at: pcr@jenabioscience.com
Taq Master Lyophilisate containing custom primers		
Hot Start Master Lyophilisate containing custom primers		

Jena Bioscience qPCR reagents provide exceptional sensitivity and accuracy



qPCR with Dual Labeled Fluorescent Probes

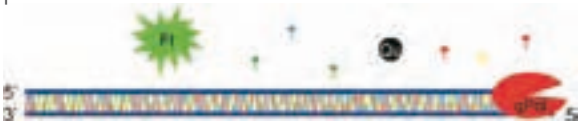


A quantitative real-time PCR assay with fluorescent probes requires polymerase, dNTPs, the dual labeled fluorescent probe, primers and template DNA. The proximity of fluorophore and quencher prevents the reporter dye on the probe from fluorescing.

The dual labeled fluorescent probe and the PCR primers bind to their target sequences during the annealing step.

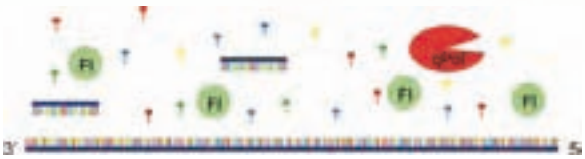
During the PCR extension step, the polymerase extends the primer.

When the polymerase reaches the probe, its 5′→3′ exonuclease activity cleaves the fluorophore from the probe. The fluorophore is released and becomes fluorescent.

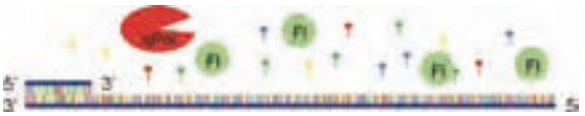


After complete extension the detected fluorescence intensity is proportional to the amount of accumulated PCR product. The next PCR amplification cycle will be run.

qPCR with EvaGreen™ Fluorescent DNA Stain



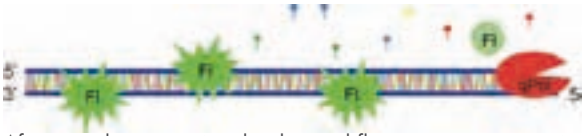
A quantitative real-time PCR assay with EvaGreen™ requires polymerase, dNTPs, EvaGreen™ Fluorescent DNA Stain, primers and template DNA. The dye molecules are nonfluorescent by itself.



The PCR primers bind to their target sequences during the annealing step.

During the PCR extension step, the polymerase extends the primer.

EvaGreen™ molecules bind to the amplicon. Due to there specific interaction with dsDNA the bound dye molecules become highly fluorescent.



After complete extension the detected fluorescence intensity is proportional to the amount of accumulated PCR product. The next PCR amplification cycle will be run.

qPCR Kits with Dual Labeled Fluorescent Probes

Our **qPCR Product Series** is designed for the quantitative real-time analysis of DNA samples using DNA probe based detection. It provides powerful tools for quantification of sample DNA in a broad dynamic range of up to 6 orders of magnitude with exceptional sensitivity and precision.

The Ready-to-Use Mixes contain UNG (Uracil-N-Glycosylase) and dUTP instead of dTTP to prevent carry-over contaminations of DNA from previous PCR reactions. An UNG treatment at the onset of thermal cycling removes uracil residues from dU-containing DNA and prevents it from serving as template.

qPCR Ready-to-Use Mixes with UNG			
qPCR Master with UNG / ROX Real-Time PCR Master Mix containing polymerase, UNG, dNTPs and reaction buffer with ROX reference dye	PCR-302S	100 reactions	130 €
	PCR-302L	500 reactions	520 €
qPCR Master with UNG Real-Time PCR Master Mix containing polymerase, UNG, dNTPs and reaction buffer	PCR-301S	100 reactions	130 €
	PCR-301L	500 reactions	520 €
qPCR Master with ROX Real-Time PCR Master Mix containing polymerase, dNTPs and reaction buffer with ROX reference dye	PCR-312S	100 reactions	110 €
	PCR-312L	500 reactions	440 €
qPCR Master Real-Time PCR Master Mix containing polymerase, dNTPs and reaction buffer	PCR-311S	100 reactions	110 €
	PCR-311L	500 reactions	440 €
qPCR Core Kits			
qPCR Core Kit with ROX Real-Time PCR Kit containing polymerase, dNTP Mix and reaction buffer with ROX reference dye	PCR-332S	100 reactions	90 €
	PCR-332L	500 reactions	360 €
qPCR Core Kit Real-Time PCR Kit containing polymerase, dNTP Mix and reaction buffer	PCR-331S	100 reactions	90 €
	PCR-331L	500 reactions	360 €
qPCR Supplements			
ROX Reference Dye Inherent reference dye allowing normalization of non-PCR related signal variation	PCR-351	500 reactions	25 €
Thermolabile UNG (Uracil N-Glycosylase) Prevention of carry-over contaminations of dU-containing DNA from previous reactions	PCR-353	200 units	100 €
qPCR Control Kit Amplification of a beta-actin gene fragment from human genomic DNA	PCR-354	500 reactions	130 €

Dual Labeled Fluorescent Probes

Dual Labeled Fluorescent Probes are the most widely used type of DNA probes providing a highly sensitive and specific method of detection. Each DNA probe consists of a 20–30 bp long sequence-specific oligonucleotide carrying a fluorophore at the 5′ end and a quencher at the 3′ end. Its complementary sequence to one of the strands of the amplicon ensures the high specificity of the system. The cleavage of the probe during the extension step of each PCR cycle results in a detectable fluorescence increase proportional to the amount of accumulated PCR product.

Dual Labeled Fluorescent Probes				
Oligo: 5′ reporter: quencher:	up to 33 bp FAM, TET, JOE[1] or HEX 3′ TAMRA	0.02 µmol scale 0.2 µmol scale 1.0 µmol scale	1 OD_{260} 5 OD_{260} 8 OD_{260}	from 109 € from 182 € from 426 €
Oligo: 5′ reporter: 3′ quencher:	up to 33 bp FAM, TET, JOE[1], HEX or TAMRA Dabcyl	0.02 µmol scale 0.2 µmol scale 1.0 µmol scale	1 OD_{260} 5 OD_{260} 8 OD_{260}	from 119 € from 192 € from 462 €
Oligo: 5′ reporter: 3′ quencher:	up to 33 bp FAM, TET, CAL FLuor Gold 540, JOE[1], HEX or CAL Fluor Orange 560 BHQ-1®	0.02 µmol scale 0.2 µmol scale 1.0 µmol scale	1 OD_{260} 5 OD_{260} 8 OD_{260}	from 109 € from 182 € from 390 €
Oligo: 5′ reporter: 3′ quencher:	up to 33 bp Cy3, TAMRA, ROX[1] or CAL FLuor Red 610 BHQ-2®	0.02 µmol scale 0.2 µmol scale 1.0 µmol scale	1 OD_{260} 5 OD_{260} 8 OD_{260}	from 234 € from 306 € from 442 €
Oligo: 5′ reporter: 3′ quencher:	up to 33 bp Cy5, IRD700 BHQ-3®	0.02 µmol scale 0.2 µmol scale 1.0 µmol scale	1 OD_{260} 5 OD_{260} 8 OD_{260}	from 244 € from 322 € from 577 €

[1] expected minimum yields: 0.02 µmol scale 1 OD_{260}; 0.2 µmol scale 2.5 OD_{260}; 1 µmol scale 6 OD_{260}

Reporter Dyes		
Dye	Excitation max [nm]	Emission max [nm]
6-FAM	495	520
TET	521	536
CAL Fluor Gold 540	522	541
JOE	520	548
HEX	535	556
CAL Fluor Orange 560	537	558
Cy3	550	570
TAMRA	546	579
ROX	576	601
CAL Fluor Red 610	590	610
Cy5	643	667
IRD 700	685	705

Dark Quencher		
Quencher	Quenching max [nm]	Quenching Range [nm]
TAMRA[2]	546	520–570
DABCYL	453	380–530
BHQ-1®	534	480–580
BHQ-2®	579	550–650
BHQ-3®	672	620–730

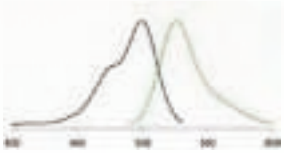
[2] TAMRA is widely used as quencher especially in combination with the reporter FAM. Please note that TAMRA is no dark quencher and contributes to an increase in background signal because of its own fluorescence emission.
Black Hole dark quencher (BHQ) probes are an advanced alternative to TAMRA and ensure a higher signal-to-noise ratio.

qPCR Kits with EvaGreen™

EvaGreen™ fluorescent DNA stain enables rapid analysis of any target DNA without additional sequence-specific DNA probes. EvaGreen™ is compatible with all common real-time PCR cyclers – simply select the standard settings for SYBR®Green or FAM!

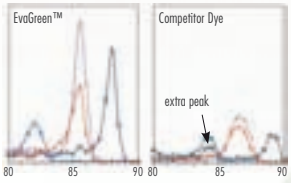
EvaGreen™ Fluorescent DNA Stain is a superior intercalator dye specially developed for real-time qPCR applications including high-resolution DNA melting curve analysis. EvaGreen™ is highly stable both thermally and hydrolytically, providing maximum convenience during routine handling. Combined with its high quantum yield and low interference with PCR it is the ideal fluorophore for real-time PCR and a superior replacement for competitor dyes.

Simply select the optical setting for SYBR®Green or FAM



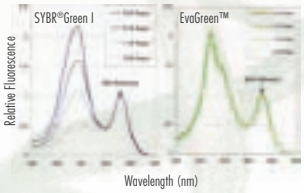
Excitation and emission spectra of EvaGreen™ is similar to SYBR®Green / FAM. Excitation max: λ_{Ex}=500 nm, Emission max: λ_{Em}=530 nm(EvaGreen™ bound to dsDNA in PBS buffer pH 7.3)

High-resolution DNA melting curve analysis



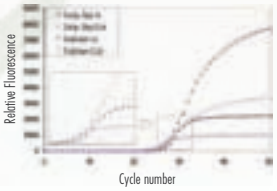
DNA melting curve analysis using EvaGreen™ and Competitor Dye with 4 different amplicons. Competitor Dye shows occasional formation of an extra melting peak.

EvaGreen® is highly stable



Degeneration of SYBR®Green I within 3 hours at 99°C. EvaGreen™ shows no detectable decrease in fluorescence intensity. (Each fluorophore 1.2 µM in Tris-HCl buffer pH 9.0)

Low interference with PCR



PCR amplification plots using EvaGreen™ and Competitor Dye at two different concentrations. Competitor Dye exhibits significant PCR inhibition at 1× concentration while EvaGreen™ does not.

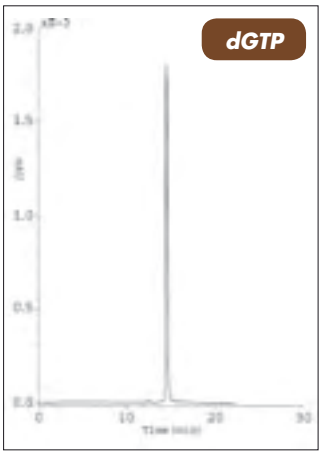
qPCR Ready-to-Use Mixes with EvaGreen™			
qPCR GreenMaster with UNG / ROX Real-Time PCR Master Mix containing polymerase, UNG, dNTPs and reaction buffer with EvaGreen™ and ROX reference dye	PCR-304S	100 reactions	130 €
	PCR-304L	500 reactions	520 €
qPCR GreenMaster with UNG Real-Time PCR Master Mix containing polymerase, UNG, dNTPs and reaction buffer with EvaGreen™	PCR-303S	100 reactions	130 €
	PCR-303L	500 reactions	520 €
qPCR GreenMaster with ROX Real-Time PCR Master Mix containing polymerase, dNTPs and reaction buffer with EvaGreen™ and ROX reference dye	PCR-314S	100 reactions	110 €
	PCR-314L	500 reactions	440 €
qPCR GreenMaster Real-Time PCR Master Mix containing polymerase, dNTPs and reaction buffer with EvaGreen™	PCR-313S	100 reactions	110 €
	PCR-313L	500 reactions	440 €
qPCR Green Core Kits			
qPCR Green Core Kit with ROX Real-Time PCR Kit containing polymerase, dNTP Mix and reaction buffer with EvaGreen™ and ROX reference dye	PCR-334S	100 reactions	90 €
	PCR-334L	500 reactions	360 €
qPCR Green Core Kit Real-Time PCR Kit containing polymerase, dNTP Mix and reaction buffer with EvaGreen™	PCR-333S	100 reactions	90 €
	PCR-333L	500 reactions	360 €
qPCR Supplements			
EvaGreen™ Fluorescent DNA Stain Superior DNA intercalator dye for DNA analysis applications	PCR-352	500 reactions	40 €

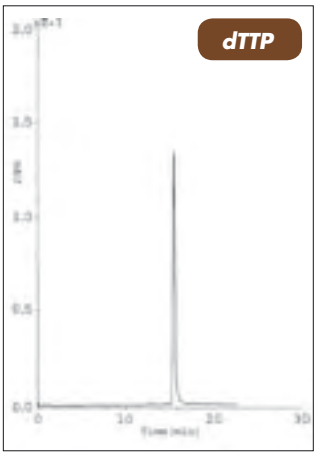
Deoxynucleotides (dNTPs)

Premium Quality dNTPs – at prices you can't ignore…!

Jena Bioscience's enzymatic **dNTP** manufacturing process and refined purification protocols ensure highest quality for deoxynucleotides. All our dNTPs are ultrapure (>99%) and quality checked by a set of PCR, RT-PCR and Klenow reactions.

Mixes			
dNTP Mix Premix of 10 mM dATP, dCTP, dGTP and dTTP	NU-1006S	200 µl	18 €
	NU-1006L	1 ml	72 €
dNTP Mix including dUTP Premix of 10 mM dATP, dCTP, dGTP and 20 mM dUTP	NU-1020S	200 µl	22 €
	NU-1020L	1 ml	88 €
Bundles			
dNTP Bundle 4×100 mM (dATP, dCTP, dGTP, dTTP)	NU-1005S	4× 200 µl	41 €
	NU-1005L	4× 1 ml	164 €
dNTP Bundle including dUTP 4×100 mM (dATP, dCTP, dGTP, dUTP)	NU-1009S	4× 200 µl	45 €
	NU-1009L	4× 1 ml	180 €
Single Solutions			
dATP, 100 mM	NU-1001	1 ml	57 €
dCTP, 100 mM	NU-1002	1 ml	57 €
dGTP, 100 mM	NU-1003	1 ml	57 €
dTTP, 100 mM	NU-1004	1 ml	57 €
dITP, 100 mM	NU-1007	1 ml	72 €
dUTP, 100 mM	NU-1008	1 ml	72 €
Lyophilisates			
dATP	NU-1001-10	10 mg	25 €
dCTP	NU-1002-10	10 mg	25 €
dGTP	NU-1003-10	10 mg	25 €
dTTP	NU-1004-10	10 mg	25 €





- Superior performance in PCR reactions with long templates
- Increased sensitivity in Real-Time PCR applications
- Available from small (ml) to large (liters) quantities
- Offered at very competitive prices
- For larger amounts than shown here, please inquire at: nucleotides@jenabioscience.com

Oligonucleotides

Standard Oligos

Custom DNA Primers from Jena Bioscience are synthetic oligonucleotides made to order with your specified sequence. They are well suitable for use in a variety of molecular biology or analytical/diagnostic applications ranging from simple PCR and sequencing to probes for quantitative gene detection.

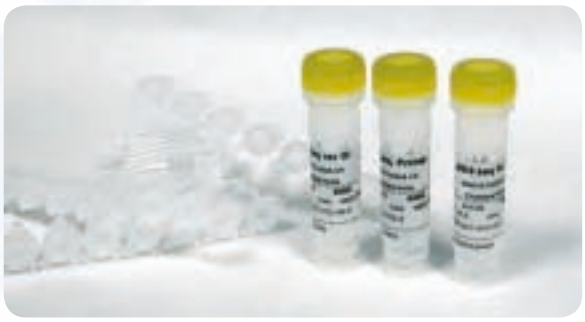
Scale [µmol]	Standard Purification*		OPC Purification*		HPLC Purification	
	€ per base	Yield [OD_{260}]	€ per base	Yield [OD_{260}]	€ per base	Yield [OD_{260}]
0.02**	0.39	3	0.75	1	0.85	1
0.04	0.46	5	0.80	2.5	0.98	2.5
0.2	1.00	16	1.20	8	1.50	8
1.0	2.40	80	–	–	3.00	25
10	–	–	–	–	20.00	–

* Standard and OPC purification can only be ordered for oligos <45 bases.
** The 0.02 µmol scale can only be ordered for oligos <34 bases.
Guaranteed yields apply for a 20mer + / - 20 %. For oligos >33 bases we cannot give a yield guarantee.
No extra charge for 5' and internal wobbles (degenerated bases). 3' wobbles require a setup fee of 20 €.
For technical reasons we have to double the price per base for oligos >80 bases.

Amount of DNA
A yield of 1 OD_{260} represents approximately 33 µg of single-stranded DNA with an equal number of the four bases. This corresponds to approximately 5 nmol (50 µl / 100 µM) of a 20-mer oligonucleotide.

Storage
Avoid repetitive freeze/thaw cycles and long term storage at concentrations below 20 µM. Aliquot oligonucleotides before freezing.

Delivery Mode	Storage Temperature	Shelf Life
Lyophilized	-20°C	1 year
Lyophilized	Room temperature	2 months
Solution	-20°C	6 months
Solution	Room temperature	1 week



Synthesis Report
A comprehensive Synthesis Report comes along with every oligo, indicating its name and sequence, synthesis scale and yield (OD, µg, nmol), delivery mode (lyophilized or solution), molecular weight, melting temperature, GC-content, purification mode and quality control.

Labeled Oligos (for Dual Labeled Fluorescent Probes please refer to page 12)

A large variety of **Modified Oligonucleotides** is available from Jena Bioscience. All prices include HPLC purification. Please note that the prices per modification are added to the price of the oligo synthesized in standard purification (see page 14). For other modifications, larger scales or further information please inquire.

5′ Fluorescent Labels				
Modification	0.02 µmol 1 OD_{260}	0.04 µmol 2 OD_{260}	0.2 µmol 3-5 OD_{260}	1.0 µmol 15 OD_{260}
6-FAM, TET	30 €	33 €	55 €	100 €
HEX, TAMRA	35 €	40 €	70 €	150 €
JOE, ROX	58 €	65 €	100 €	175 €
Fluorescein	30 €	33 €	55 €	100 €
Cy3, Cy5	50 €	56 €	95 €	202 €
Cy5.5	112 €	140 €	163 €	–
IRD 700 / 800	38 €	42 €	50 €	180 €
CAL Fluor Gold 540	75 €	85 €	99 €	180 €
CAL Fluor Orange 560	50 €	55 €	75 €	180 €
CAL Fluor Red 610	80 €	90 €	120 €	150 €
Rhodamine ITC	37 €	42 €	50 €	115 €
Rhodamine Green	95 €	110 €	140 €	240 €
Texas Red	155 €	170 €	200 €	320 €

3′ Fluorescent Labels				
Modification	0.02 µmol 1 OD_{260}	0.04 µmol 2 OD_{260}	0.2 µmol 3-5 OD_{260}	1.0 µmol 15 OD_{260}
6-FAM	30 €	33 €	55 €	200 €
HEX	50 €	60 €	115 €	400 €
TAMRA	50 €	60 €	75 €	220 €
Fluorescein	30 €	33 €	45 €	150 €
Cy3, Cy5	50 €	61 €	95 €	213 €

Internal Fluorescent Labels				
Modification	0.02 µmol 1 OD_{260}	0.04 µmol 2 OD_{260}	0.2 µmol 3-5 OD_{260}	1.0 µmol 15 OD_{260}
Fluorecein / FITC	150 €	200 €	240 €	400 €
TAMRA	150 €	200 €	240 €	400 €
Cy5	168 €	225 €	270 €	449 €

5′ Non-Fluorescent Labels				
Modification	0.02 µmol 1 OD_{260}	0.04 µmol 2 OD_{260}	0.2 µmol 3-5 OD_{260}	1.0 µmol 15 OD_{260}
Phosphate	18 €	25 €	35 €	40 €
C6 Amino	15 €	20 €	25 €	30 €
C12 Amino	26 €	35 €	50 €	95 €
Biotin	33 €	40 €	55 €	135 €
Thiol *	53 €	60 €	75 €	155 €
Digoxigenin	69 €	75 €	95 €	155 €
Inosine	12.50 €	15 €	17.50 €	20 €
2′ Deoxyuridine	12.50 €	15 €	17.50 €	20 €
Methylcytosin	17.50 €	20 €	25 €	50 €

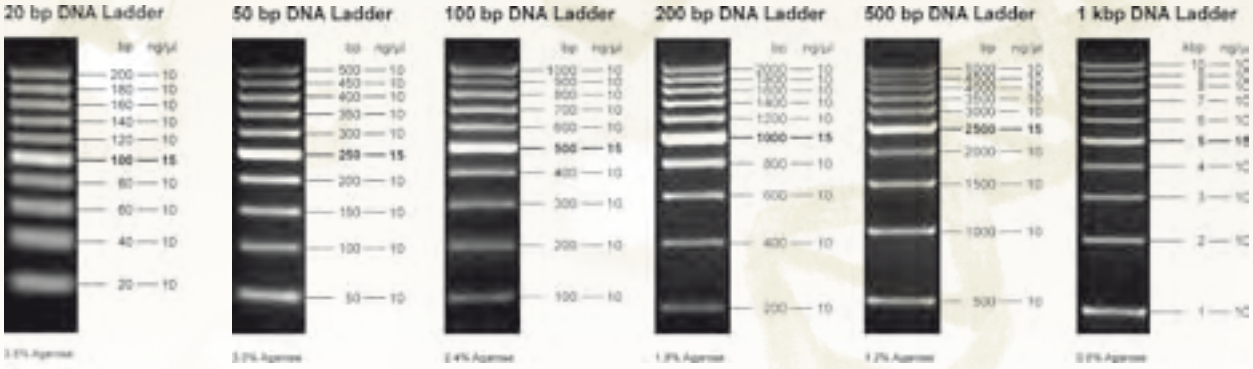
3′ Non-Fluorescent Labels				
Modification	0.02 µmol 1 OD_{260}	0.04 µmol 2 OD_{260}	0.2 µmol 3-5 OD_{260}	1.0 µmol 15 OD_{260}
Phosphate	18 €	25 €	35 €	40 €
C7 Amino	15 €	20 €	40 €	105 €
Biotin	33 €	40 €	55 €	135 €
Thiol	35 €	45 €	60 €	110 €
Methylcytosin	17.50 €	20 €	25 €	50 €
ddC	30 €	50 €	70 €	205 €
Inosine	12.50 €	15 €	17.50 €	20 €
2′ Deoxyuridine	12.50 €	15 €	17.50 €	20 €
Dabcyl	50 €	–	95 €	195 €
BHQ-1	55 €	–	115 €	355 €
BHQ-2	65 €	–	135 €	395 €
BHQ-3	70 €	–	140 €	400 €

Internal Non-Fluorescent Labels				
Modification	0.02 µmol 1 OD_{260}	0.04 µmol 2 OD_{260}	0.2 µmol 3-5 OD_{260}	1.0 µmol 15 OD_{260}
C2 Amino dT	70 €	80 €	120 €	290 €
Biotin dT **	95 €	105 €	145 €	360 €
Methylcytosin	17.50 €	20 €	25 €	50 €
Inosine	12.50 €	15 €	17.50 €	20 €
2′ Deoxyuridine	12.50 €	15 €	17.50 €	20 €

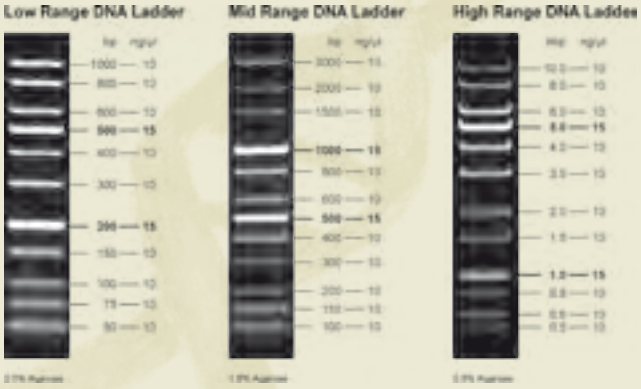
Internal fluorescent modifications require a "T" to be attached. The 0.02 µmol scale can only be ordered for oligos <34 bases.
Guaranteed yields apply for a 20mer + / - 20 %. For oligos >33 bases we cannot give a yield guarantee. Prices for 3′ modifications and internal modifications are valid up to 40 bases.
* For 5′ Thiol a set up fee of 110 € € per order will be charged.
** For internal Biotin dT a set up fee of 250 € per order will be charged.

DNA Ladders

Log Scale DNA Ladders are well suited for standard gel electrophoresis applications. The ladders can be combined if small and large fragments need to be analyzed on the same gel.



Linear Scale DNA Ladders are designed to show virtually uniform spacing over a large fragment size range.



DNA Fragment Separation on Agarose Gels – an Overview

DNA fragment size	agarose gel concentration	orange G running at approx.	bromophenol blue running at approx.	xylene cyanol running at approx.
< 20 bp	3.6%	2 bp	40 bp	280 bp
50 bp – 500 bp	3.0%	2 bp	60 bp	500 bp
100 bp – 1 kb	2.4%	3 bp	100 bp	900 bp
200 bp – 2 kb	1.8%	5 bp	200 bp	1.8 kb
500 bp – 5 kb	1.2%	10 bp	500 bp	4.5 kb
> 1 kb	0.6%	100 bp	1.2 kb	12 kb

DNA Ladders

Jena Bioscience DNA Ladders allow sizing and concentration estimates of DNA fragments on agarose gels generated by PCR or restriction digest. The Log Scale and Linear Scale Ladders are supplied in ready-to-load format containing tracking dye.

Log Scale DNA Ladders			
20 bp DNA Ladder 20–200 bp, 500 µl, containing orange G	M-212	100 lanes	60 €
50 bp DNA Ladder 50–500 bp, 500 µl, containing orange G	M-213	100 lanes	50 €
100 bp DNA Ladder 100–1000 bp, 500 µl, containing orange G / xylene cyanol	M-214	100 lanes	40 €
200 bp DNA Ladder 200–2000 bp, 500 µl, containing bromophenol blue / xylene cyanol	M-215	100 lanes	40 €
500 bp DNA Ladder 500–5000 bp, 500 µl, containing bromophenol blue / xylene cyanol	M-216	100 lanes	30 €
1 kb DNA Ladder 1–10 kb, 500 µl, containing bromophenol blue / xylene cyanol	M-217	100 lanes	30 €

Linear Scale DNA Ladders			
Low Range DNA Ladder 50–1000 bp, 500 µl, containing orange G	M-202	100 lanes	55 €
Mid Range DNA Ladder 100–3000 bp, 500 µl, containing bromophenol blue / xylene cyanol	M-203	100 lanes	45 €
High Range DNA Ladder 0.5–10 kb, 500 µl, containing bromophenol blue / xylene cyanol	M-204	100 lanes	35 €

Classic DNA Ladders			
λDNA / *Hind* III Digest	M-101S	100 µg	10 €
	M-101L	500 µg	40 €
λDNA / *Eco*R I Digest	M-102S	100 µg	10 €
	M-102L	500 µg	40 €
λDNA / *Eco*R I / *Hind* III Digest	M-103S	100 µg	10 €
	M-103L	500 µg	40 €
λDNA / *Sty* I Digest	M-104S	100 µg	10 €
	M-104L	500 µg	40 €
λDNA / *Bst*E II Digest	M-106S	100 µg	10 €
	M-106L	500 µg	40 €
pBR322 / *Hinf* I Digest	M-107S	100 µg	40 €
	M-107L	500 µg	160 €
pUC19 / *Bsi*S I (Hpa II) Digest	M-108S	100 µg	40 €
	M-108L	500 µg	160 €

DNA Sequencing

Kits (sequencing with fluorescently labeled primers)

Our **DNA Cycle Sequencing Kit** is designed for DNA sequencing based on the Sanger Method (dideoxy chain termination method). It provides a powerful tool to derive rapidly DNA and gene sequence information as required in a multitude of molecular biological and biotechnological applications.
The performance of the kit is based on a specifically engineered Taq polymerase showing an equal capability of incorporating ddNTPs and dNTPs. This guarantees the generation of uniform and easy to read sequence band patterns at lowest background. A minimal band compression of GC-rich DNA regions is achieved by optimally balanced termination mixtures containing 7-deaza-dGTP. The reaction chemistry of the kit is optimized for automated DNA sequencers and requires fluorescently labeled primers.

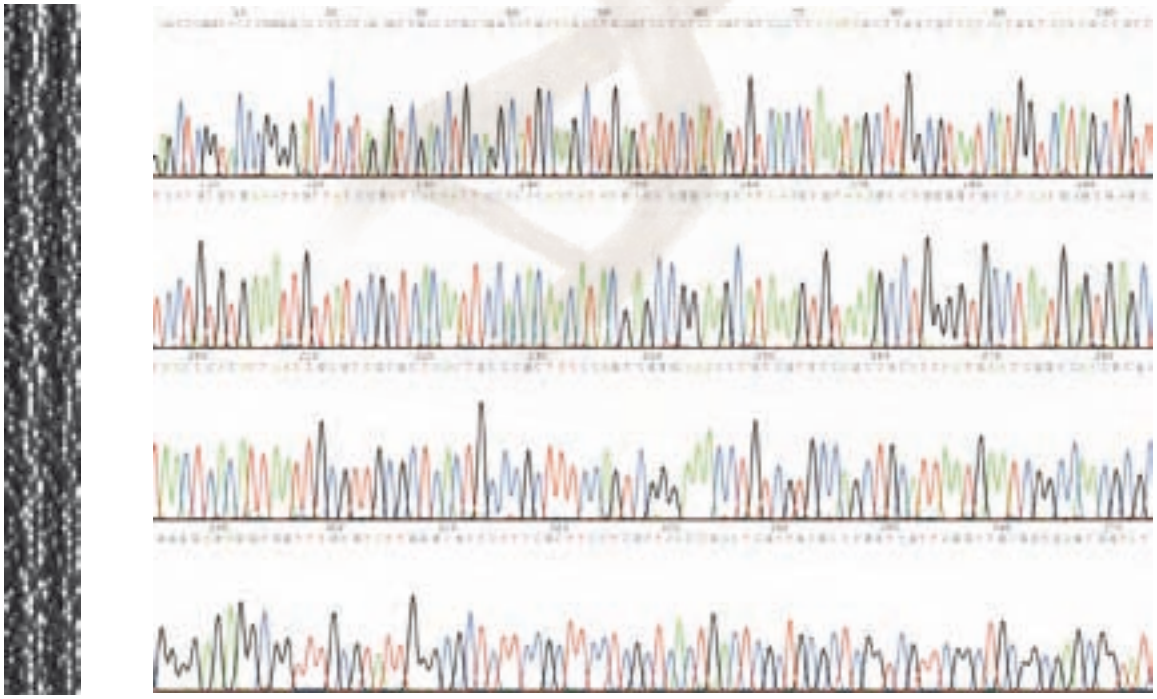
DNA Cycle Sequencing Kit for sequencing based on fluorescently labeled primers		
PCR-401S	100 reactions	150 €
PCR-401L	500 reactions	600 €

Service

Sequencing Service of plasmid DNA or PCR amplification products

- Sequencing of 500 to 600 bases per run
- Fast sequencing data transfer per e-mail
- Sequencing with standard or custom primers
- Purification of plasmid DNA or PCR fragments

For inquiries or further information please refer to:
www.jenagen.de



Dideoxynucleotides (ddNTPs) and Termination Mixes

Dideoxynucleotide (ddNTP) Bundles			
ddNTP Bundle 4× 10 mM each (ddATP, ddCTP, ddGTP, ddTTP)	NU-1019S	4x 200 µl	135 €
	NU-1019L	4x 1 ml	540 €
Dideoxynucleotide (ddNTP) Single Solutions			
ddATP 10 mM	NU-1015S	200 µl	45 €
	NU-1015L	1 ml	180 €
ddCTP 10 mM	NU-1016S	200 µl	45 €
	NU-1016L	1 ml	180 €
ddGTP 10 mM	NU-1017S	200 µl	45 €
	NU-1017L	1 ml	180 €
ddTTP 10 mM	NU-1018S	200 µl	45 €
	NU-1018L	1 ml	180 €
Termination Mixes (containing 7-deaza-dGTP) for cycle sequencing			
Terminator A 150 µM each dNTP (dATP, dCTP, dGTP / 7-deaza dGTP, dTTP), 1.5 µM ddATP	PCR-411	1 ml	40 €
Terminator C 150 µM each dNTP (dATP, dCTP, dGTP / 7-deaza dGTP, dTTP), 1.5 µM ddCTP	PCR-412	1 ml	40 €
Terminator G 150 µM each dNTP (dATP, dCTP, dGTP / 7-deaza dGTP, dTTP), 1.5 µM ddGTP	PCR-413	1 ml	40 €
Terminator T 150 µM each dNTP (dATP, dCTP, dGTP / 7-deaza dGTP, dTTP), 1.5 µM ddTTP	PCR-414	1 ml	40 €
Termination Mixes (containing 7-deaza-dGTP) for non-cycle sequencing			
Terminator A 80 µM each dNTP (dATP, dCTP, dGTP / 7-deaza dGTP, dTTP), 8 µM ddATP	PCR-416	1 ml	40 €
Terminator C 80 µM each dNTP (dATP, dCTP, dGTP / 7-deaza dGTP, dTTP), 8 µM ddCTP	PCR-417	1 ml	40 €
Terminator G 80 µM each dNTP (dATP, dCTP, dGTP / 7-deaza dGTP, dTTP), 8 µM ddGTP	PCR-418	1 ml	40 €
Terminator T 80 µM each dNTP (dATP, dCTP, dGTP / 7-deaza dGTP, dTTP), 8 µM ddTTP	PCR-419	1 ml	40 €
Sequencing Polymerase			
Sequencing Pol Taq Pol mutant for incorporation of ddNTPs	PCR-206S	200 units	70 €
	PCR-206L	1000 units	280 €

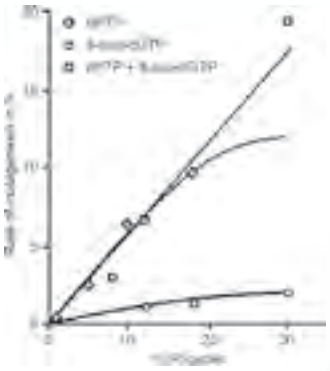
DNA Mutagenesis

The unique Jena Bioscience product series for random mutagenesis provides you with "ready-to-go" kits for inserting random mutations into your gene of interest. All materials are accompanied by a streamlined documentation that maximizes success.

Within three billion years of evolution, nature has produced a plethora of proteins simply by repeated cycles of random mutagenesis followed by in vivo selection for superior function of the encoded proteins. This example of natural evolution has guided researchers within the last two decades to develop strategies for in vitro permutation of proteins.
Among the variety of strategies applied, three major powerful techniques have emerged.

Mutagenesis by dNTP Analogs

The method can achieve rates of mutagenesis of up to 20 %. It is based on incorporation of mutagenic dNTP analogs (8-oxo-dGTP and dPTP) into an amplified DNA fragment by a standard PCR. The mutagenic dNTPs are eliminated by a second PCR step in the presence of the four natural dNTPs, leaving highly mutated DNA ready for further investigation.

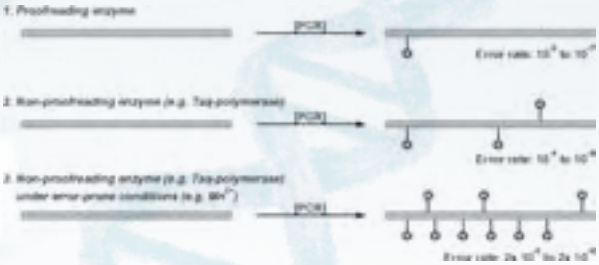


Rate of mutagenesis as a function of the number of PCR cycles

Mutagenesis by Error-Prone PCR

Mutagenesis is performed by a PCR reaction under conditions (increased $MgCl_2$ concentration, additional $MnCl_2$ and unbalanced dNTP ratio) that induce an increased error-rate of the DNA-polymerase.

Simply run the PCR protocol provided in the manual and achieve rates of mutagenesis in the range of 0.6–2.0% in a single PCR step!



Enhanced mutational rate by error-prone PCR compared to standard PCR reactions

Mutagenesis by DNA Shuffling

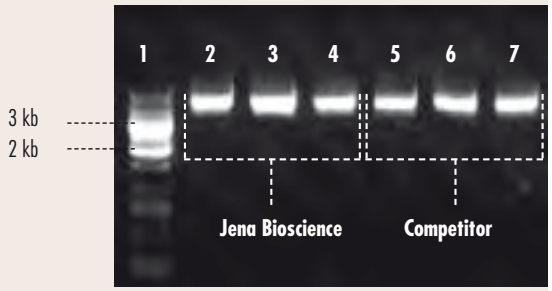
Developed by Stemmer (1994) DNA shuffling generates libraries by random fragmentation of one gene or a pool of related genes, followed by the reassembly of the fragments in a self-priming PCR reaction. The rates of mutagenesis are similar to the error-prone PCR but DNA shuffling allows the recombination of sequences from different, related genes.

General types of DNA shuffling

DNA Mutagenesis Kits			
JBS dNTP-Mutagenesis Kit Random Mutagenesis by dNTP Analogs	PP-101	15 reactions	240 €
JBS Error-Prone Kit Random Mutagenesis by Error-Prone PCR	PP-102	15 reactions	190 €
JBS DNA-Shuffling Kit Random Mutagenesis by DNA Shuffling	PP-103	15 reactions	240 €

DNA Preparation and Cleanup

Our **Plasmid Mini-Prep Kit** is designed for isolation of high-purity plasmid or cosmid DNA from cells for subsequent sequencing, restriction digests, or transformations. Spin column based preparation provides an easy and efficient way of DNA isolation without shearing or significant loss of product and allows elution in a small volume of low-salt buffer. It eliminates time consuming phenol-chloroform extraction and alcohol precipitation and can be used either in micro-centrifuges or on vacuum manifolds. The kit allows the extraction of up to 20 µg DNA per preparation.



6×2 ml taken from a 50 ml overnight culture of recombinant E. coli strain with an 8 kbp plasmid. Aliquots 2–4 were purified with the Plasmid Mini-Prep Kit from Jena Bioscience and aliquots 5–7 were purified with a competitor's kit. Purified plasmid was loaded onto a 1% agarose gel.

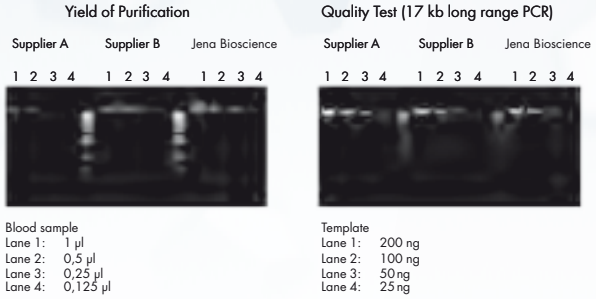
The **PCR Purification Kit** allows the work-up of PCR reactions (removal of nucleotides, primers, proteins, salts and other impurities). The preparation is based on a silica-membrane technology for binding DNA in high-salt and its elution in low-salt buffer. The kit provides a simple and efficient way to purify linear or circular DNA in the range from 100 bp to 10 kbp and is optimized for working with DNA amounts from 50 to 500 ng. It does not require any organic extractions or precipitation and guarantees high yields and reproducibility.

The **Agarose Gel Extraction Kit** is designed for high-yield recovery of DNA from agarose gels with simultaneous removal of primers, nucleotides, proteins, salts, agarose, ethidium bromide, and other impurities. The preparation is based on a silica-membrane technology for binding DNA in high-salt and its elution in low-salt buffer. The kit provides a simple and efficient way to purify DNA in a size range between 100 bp and 10 kbp. It does not require any organic extractions or precipitation and guarantees high yields and reproducibility.

DNA Preparation Kits			
Plasmid Mini-Prep Kit	PP-203S	50 preparations	45 €
	PP-203L	250 preparations	180 €
PCR Purification Kit	PP-201S	50 preparations	45 €
	PP-201L	250 preparations	180 €
Agarose Gel Extraction Kit	PP-202S	50 preparations	45 €
	PP-202L	250 preparations	180 €

Genomic DNA Purification Kits are designed for convenient and fast isolation of total DNA from a variety of sample sources including whole blood, bacteria, plant cells, fresh or frozen animal tissues and cells, or yeast.
The solution based systems minimize DNA fragmentation that may be problematic in other spin-column / filtration based methods. Because phenol or chloroform is not used it is safe and does not produce any harmful waste.

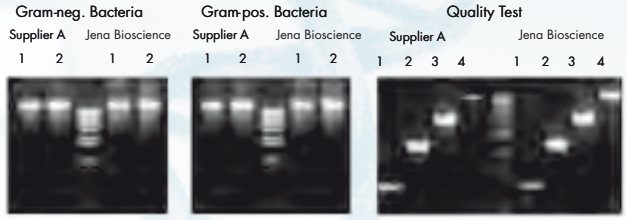
Genomic DNA purification from whole blood



Blood sample
Lane 1: 1 µl
Lane 2: 0,5 µl
Lane 3: 0,25 µl
Lane 4: 0,125 µl

Template
Lane 1: 200 ng
Lane 2: 100 ng
Lane 3: 50 ng
Lane 4: 25 ng

Genomic DNA purification from bacteria

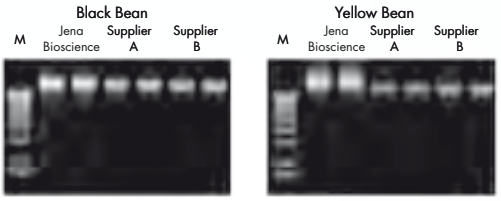


Lane 1: E. coli
Lane 2: Agrobacterium tumefacience

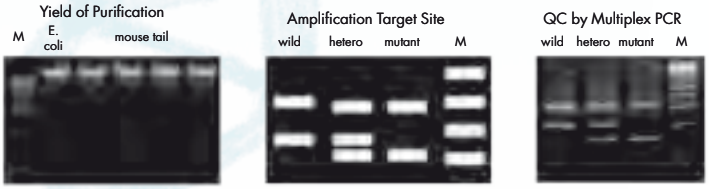
Lane 1: C. glutamicum
Lane 2: Bacillus subtilis

Lane 1: 350 bp
Lane 2: 1.2 kb
Lane 3: 3 kb
Lane 4: 10 kb

Genomic DNA purification from plant tissue



Genomic DNA purification from animal tissue and fungi

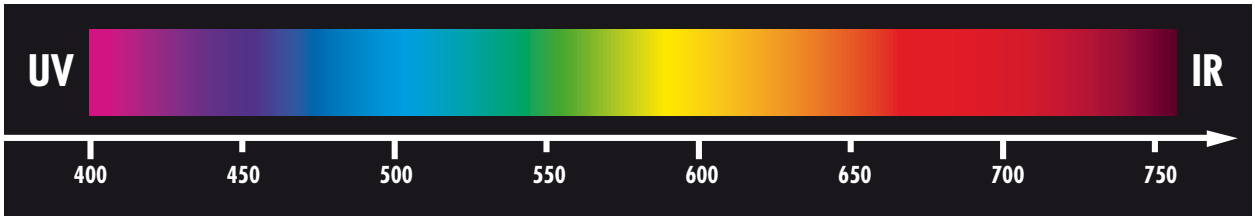


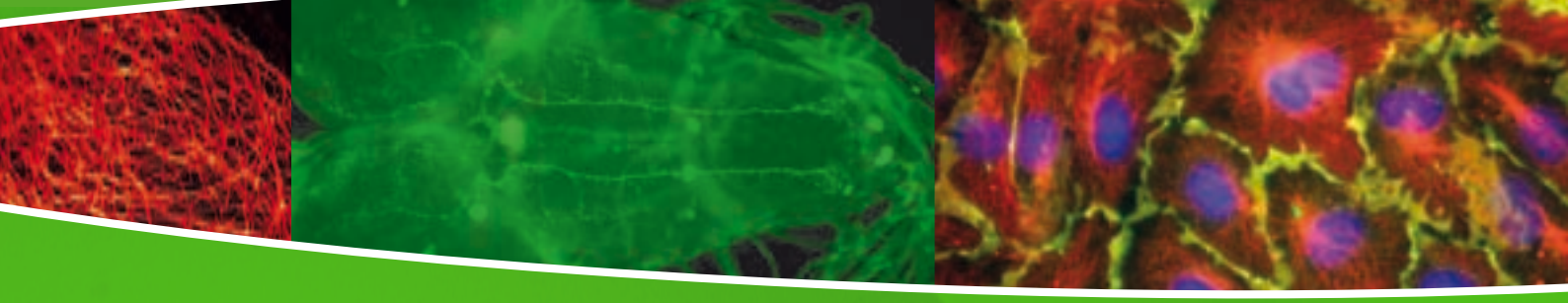
Genomic DNA Purification Kits			
Blood DNA Preparation Kit Genomic DNA purification from whole blood	PP-205S	100 preparations	80 €
	PP-205L	400 preparations	245 €
Bacteria DNA Preparation Kit Genomic DNA purification from bacteria	PP-206S	100 preparations	80 €
	PP-206L	400 preparations	245 €
Plant DNA Preparation Kit Genomic DNA purification from plant tissue	PP-207S	100 preparations	80 €
	PP-207L	400 preparations	245 €
Animal and Fungi DNA Preparation Kit Genomic DNA purification from animal tissue and fungi	PP-208S	100 preparations	80 €
	PP-208L	400 preparations	245 €
Yeast DNA Preparation Kit Genomic DNA purification from yeast	PP-209S	50 preparations	80 €
	PP-209L	400 preparations	245 €

DNA Labeling

Jena Bioscience Labeling Kits guarantee superior results and performance. The fluorescently labeled dUTP analogs provided in the kits are optimized for enzymatic incorporation into DNA by our proprietary linker technology. Outstanding stability and quantum yield of the thoroughly selected fluorophores combined with high incorporation rates of the dye-dUTP analogs make them the ideal choice for all typical DNA labeling applications such as FISH, single molecule detection, microarray gene expression profiling and other nucleic acid hybridization assays.

Emission color	Labeling dye	Absorption max. [nm]	Emission max. [nm]	Replacement for
blue	Atto 425	436	484	DEAC: 430 / 477 nm
green	Atto 488	501	523	Alexa Fluor 488: 495 / 519 nm Fluorescein (FITC): 495 / 520 nm FAM: 495 / 520 nm Oregon Green 514: 506 / 526 nm Rhodamine green: 503 / 528 nm Rhodamine 123: 507 / 529 nm
yellow	Atto 550	554	576	Alexa Fluor 555: 555 / 565 nm Cy 3: 550 / 57 0 nm Alexa Fluor 546: 556 / 573 nm TAMRA: 546 / 576 nm Rhodamine Red: 560 / 580 nm Spectrum Orange: 559 / 588 nm
orange	Texas Red	583	603	Rhodamine ITC: 572 / 596 nm Cy 3.5: 581 / 596 nm ROX: 576 / 601 nm Alexa Fluor 568: 578 / 603 nm
orange	Atto 590	594	624	Alexa Fluor 594: 590 / 617 nm Alexa Fluor 610: 612 / 628 nm
red	Atto 647N	644	669	Alexa Fluor 647: 650 / 665 nm Cy 5: 643 / 667 nm





Fluorescent Labeling by PCR

PCR Labeling Kits are recommended for direct labeling of DNA by PCR using Taq polymerase. The kits contains all reagents (except primer and template) required for PCR labeling providing a highly efficient, easy-to-perform and rapid labeling technology.

Kits for DNA Labeling by PCR			
Atto425 PCR Labeling Kit Blue-green fluorescent DNA labeling by PCR	PP-301S-425	10 reactions	115 €
	PP-301L-425	50 reactions	460 €
Atto488 PCR Labeling Kit Green fluorescent DNA labeling by PCR	PP-301S-488	10 reactions	115 €
	PP-301L-488	50 reactions	460 €
Atto550 PCR Labeling Kit Yellow fluorescent DNA labeling by PCR	PP-301S-550	10 reactions	115 €
	PP-301L-550	50 reactions	460 €
TexasRed PCR Labeling Kit Orange fluorescent DNA labeling by PCR	PP-301S-TXR	10 reactions	115 €
	PP-301L-TXR	50 reactions	460 €
Atto590 PCR Labeling Kit Orange fluorescent DNA labeling by PCR	PP-301S-590	10 reactions	115 €
	PP-301L-590	50 reactions	460 €
Atto647N PCR Labeling Kit Red fluorescent DNA labeling by PCR	PP-301S-647N	10 reactions	115 €
	PP-301L-647N	50 reactions	460 €

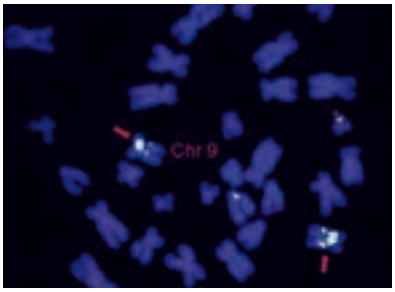
Fluorescently Labeled dUTP			
Atto425-dUTP-PCR Blue-green fluorescently labeled aminoallyl-dUTP	PP-302S-425	10 µl / 1 mM	95 €
	PP-302L-425	50 µl / 1 mM	380 €
Atto488-dUTP-PCR Green fluorescently labeled aminoallyl-dUTP	PP-302S-488	10 µl / 1 mM	95 €
	PP-302L-488	50 µl / 1 mM	380 €
Atto550-dUTP-PCR Yellow fluorescently labeled aminoallyl-dUTP	PP-302S-550	10 µl / 1 mM	95 €
	PP-302L-550	50 µl / 1 mM	380 €
TexasRed-dUTP-PCR Orange fluorescently labeled aminoallyl-dUTP	PP-302S-TXR	10 µl / 1 mM	95 €
	PP-302L-TXR	50 µl / 1 mM	380 €
Atto590-dUTP-PCR Orange fluorescently labeled aminoallyl-dUTP	PP-302S-590	10 µl / 1 mM	95 €
	PP-302L-590	50 µl / 1 mM	380 €
Atto647N-dUTP-PCR Red fluorescently labeled aminoallyl-dUTP	PP-302S-647N	10 µl / 1 mM	95 €
	PP-302L-647N	50 µl / 1 mM	380 €

Fluorescent Labeling by Nick Translation

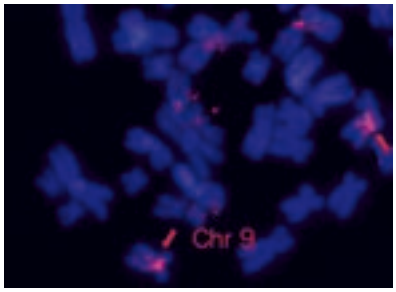
NT Labeling Kits contain all reagents (except primer and template) required for direct labeling of DNA by nick translation using DNA polymerase I / DNase I.

Kits for DNA Labeling by Nick Translation			
Atto425 NT Labeling Kit Blue-green fluorescent DNA labeling by nick translation	PP-305S-425	10 reactions	115 €
	PP-305L-425	50 reactions	460 €
Atto488 NT Labeling Kit Green fluorescent DNA labeling by nick translation	PP-305S-488	10 reactions	115 €
	PP-305L-488	50 reactions	460 €
Atto550 NT Labeling Kit Yellow fluorescent DNA labeling by nick translation	PP-305S-550	10 reactions	115 €
	PP-305L-550	50 reactions	460 €
Atto590 NT Labeling Kit Orange fluorescent DNA labeling by nick translation	PP-305S-590	10 reactions	115 €
	PP-305L-590	50 reactions	460 €
Atto647N NT Labeling Kit Red fluorescent DNA labeling by nick translation	PP-305S-647N	10 reactions	115 €
	PP-305L-647N	50 reactions	460 €

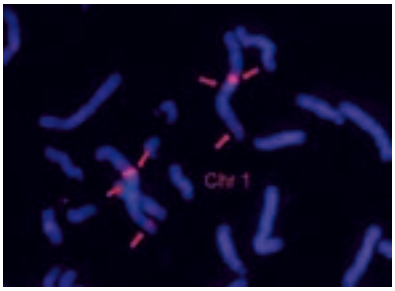
Fluorescently Labeled dUTP			
Atto425-dUTP-NT Blue-green fluorescently labeled aminoallyl-dUTP	PP-306S-425	10 µl / 1 mM	95 €
	PP-306L-425	50 µl / 1 mM	380 €
Atto488-dUTP-NT Green fluorescently labeled aminoallyl-dUTP	PP-306S-488	10 µl / 1 mM	95 €
	PP-306L-488	50 µl / 1 mM	380 €
Atto550-dUTP-NT Yellow fluorescently labeled aminoallyl-dUTP	PP-306S-550	10 µl / 1 mM	95 €
	PP-306L-550	50 µl / 1 mM	380 €
Atto590-dUTP-NT Orange fluorescently labeled aminoallyl-dUTP	PP-306S-590	10 µl / 1 mM	95 €
	PP-306L-590	50 µl / 1 mM	380 €
Atto647N-dUTP-NT Red fluorescently labeled aminoallyl-dUTP	PP-306S-647N	10 µl / 1 mM	95 €
	PP-306L-647N	50 µl / 1 mM	380 €



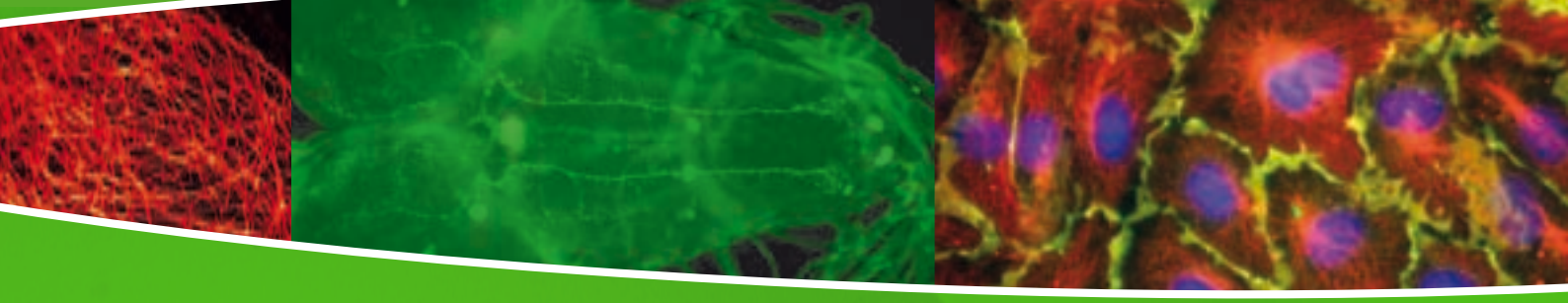
Atto 488 Labeling Kit



Atto 550 Labeling Kit



Atto 590 Labeling Kit



Non-fluorescent Labeling by PCR

Labeling Kits			
Biotin PCR Labeling Kit Kit for non-fluorescent DNA labeling by PCR	PP-303S-BIO	20 reactions	115 €
	PP-303L-BIO	100 reactions	460 €

Labeled dNTPs			
Biotin-dATP-PCR Non-fluorescently labeled propargylamino-dATP	PP-314S-BIO	10 µl / 1 mM	90 €
	PP-314L-BIO	50 µl / 1 mM	360 €
Biotin-dCTP-PCR Non-fluorescently labeled propagylamino-dCTP	PP-324S-BIO	10 µl / 1 mM	60 €
	PP-324L-BIO	50 µl / 1 mM	240 €
Biotin-dUTP-PCR Non-fluorescently labeled aminoallyl-dUTP	PP-304S-BIO	20 µl / 1 mM	90 €
	PP-304L-BIO	100 µl / 1 mM	360 €

Our Assay Kits, containing fluorescent streptavidin or avidin, are perfectly suited for binding and fluorescent detection of immobilized biotinylated samples such as proteins and DNA.

Fluorescent streptavidin is a 60 kDa tetrameric protein purified from the bacterium *Streptomyces avidinii* and labeled with fluorophores providing high fluorescence intensities. Each subunit binds one biotin molecule with high affinity. Streptavidin is not glycosylated and shows much less nonspecific interactions than avidin.

Streptavidin Assay Kits			
Streptavidin-Atto425 Assay Kit	FP-303-425	100 assays	190 €
Streptavidin-Atto488 Assay Kit	FP-303-488	100 assays	190 €
Streptavidin-Atto532 Assay Kit	FP-303-532	100 assays	190 €
Streptavidin-Atto550 Assay Kit	FP-303-550	100 assays	190 €
Streptavidin-Atto590 Assay Kit	FP-303-590	100 assays	190 €
Streptavidin-Atto647N Assay Kit	FP-303-647N	100 assays	190 €
Streptavidin-Atto655 Assay Kit	FP-303-655	100 assays	190 €

Fluorescent avidin is a 66 kDa tetrameric glycoprotein labeled with fluorophores providing high fluorescence intensities. Each subunit binds one biotin molecule with high affinity. The affinity of avidin for biotin is even stronger than of streptavidin, however, avidin is highly glycosylated and therefore causes higher background than streptavidin due to nonspecific interactions.

Avidin Assay Kits			
Avidin-Atto425 Assay Kit	FP-304-425	100 assays	180 €
Avidin-Atto488 Assay Kit	FP-304-488	100 assays	180 €
Avidin-Atto532 Assay Kit	FP-304-532	100 assays	180 €
Avidin-Atto550 Assay Kit	FP-304-550	100 assays	180 €
Avidin-Atto590 Assay Kit	FP-304-590	100 assays	180 €
Avidin-Atto647N Assay Kit	FP-304-647N	100 assays	180 €
Avidin-Atto655 Assay Kit	FP-304-655	100 assays	180 €

Restriction Enzymes

Jena Bioscience offers a wide variety of **Restriction Enzymes** at very competitive prices. Most of them allow fast digestion in five minutes.

Price List

Enzyme	Cat.-No.	Amount	Price
***Alu* I**	EN-101S	600 units	25 €
	EN-101L	3,000 units	100 €
***Apa*L I**	EN-172S	2,000 units	25 €
	EN-172L	10,000 units	100 €
***Asu* II**	EN-102S	3,500 units	25 €
	EN-102L	17,500 units	100 €
***Bam*H I**	EN-103S	7,500 units	25 €
	EN-103L	37,500 units	100 €
***Bcl* I** (50°C)	EN-104S	2,500 units	25 €
	EN-104L	12,500 units	100 €
***Bgl* I**	EN-105S	2,000 units	25 €
	EN-105L	10,000 units	100 €
***Bgl* II**	EN-106S	1,300 units	25 €
	EN-106L	6,500 units	100 €
***Bse*A I** (55°C)	EN-107S	650 units	25 €
	EN-107L	3,250 units	100 €
***Bse*B I** (60°C)	EN-108S	4,500 units	25 €
	EN-108L	22,500 units	100 €
***Bse*C I** (55°C)	EN-109S	3,500 units	25 €
	EN-109L	17,500 units	100 €
***Bsh*F I**	EN-110S	7,000 units	25 €
	EN-110L	35,000 units	100 €
***Bsi*S I** (55°C)	EN-111S	2,200 units	25 €
	EN-111L	11,000 units	100 €
***Bss*A I** (65°C)	EN-112S	250 units	25 €
	EN-112L	1,250 units	100 €
***Bst*E II** (60°C)	EN-144S	1,750 units	25 €
	EN-144L	8,750 units	100 €
***Csp*A I**	EN-113S	150 units	25 €
	EN-113L	750 units	100 €
***Dpn* I**	EN-160S	200 units	25 €
	EN-160L	1,000 units	100 €
***Eco*R I**	EN-114S	15,000 units	25 €
	EN-114L	75,000 units	100 €
***Eco*R V**	EN-115S	3,000 units	25 €
	EN-115L	15,000 units	100 €
***Hind* III**	EN-116S	7,500 units	25 €
	EN-116L	37,500 units	100 €
***Hinf* I**	EN-117S	2,500 units	25 €
	EN-117L	12,500 units	100 €
***Hpa* I**	EN-118S	750 units	25 €
	EN-118L	3,750 units	100 €
***Kpn* I**	EN-119S	3,500 units	25 €
	EN-119L	17,500 units	100 €
***Mbo* I**	EN-120S	300 units	25 €
	EN-120L	1,500 units	100 €
***Msp*C I**	EN-121S	1,300 units	25 €
	EN-121L	6,500 units	100 €

Enzyme	Cat.-No.	Amount	Price
***Nae* I**	EN-122S	300 units	25 €
	EN-122L	1,500 units	100 €
***Nco* I**	EN-123S	600 units	25 €
	EN-123L	3,000 units	100 €
***Nhe* I**	EN-146S	550 units	25 €
	EN-146L	2,750 units	100 €
***Not* I**	EN-124S	300 units	25 €
	EN-124L	1,500 units	100 €
***Nru* I**	EN-125S	700 units	25 €
	EN-125L	3,500 units	100 €
***Psp*P I** (25°C)	EN-126S	900 units	25 €
	EN-126L	4,500 units	100 €
***Pst* I**	EN-127S	8,000 units	25 €
	EN-127L	40,000 units	100 €
***Pvu* II**	EN-128S	4,500 units	25 €
	EN-128L	22,500 units	100 €
***Rsa* I**	EN-129S	1,000 units	25 €
	EN-129L	5,000 units	100 €
***Sal* I**	EN-130S	2,000 units	25 €
	EN-130L	10,000 units	100 €
***Sau*3A I**	EN-150S	500 units	25 €
	EN-150L	2,500 units	100 €
***Sca* I**	EN-131S	1,200 units	25 €
	EN-131L	6,000 units	100 €
***Sfi* I** (50°C)	EN-132S	400 units	25 €
	EN-132L	2,000 units	100 €
***Sgr*B I**	EN-133S	1,600 units	25 €
	EN-133L	8,000 units	100 €
***Sla* I**	EN-134S	5,000 units	25 €
	EN-134L	25,000 units	100 €
***Sma* I** (25°C)	EN-135S	1,100 units	25 €
	EN-135L	5,500 units	100 €
***Sna*B I**	EN-136S	350 units	25 €
	EN-136L	1,750 units	100 €
***Sph* I**	EN-137S	250 units	25 €
	EN-137L	1,250 units	100 €
***Sse*B I**	EN-138S	1,500 units	25 €
	EN-138L	7,500 units	100 €
***Ssp* I**	EN-139S	600 units	25 €
	EN-139L	3,000 units	100 €
***Sst* I**	EN-140S	1,600 units	25 €
	EN-140L	8,000 units	100 €
***Sty* I**	EN-141S	6,000 units	25 €
	EN-141L	30,000 units	100 €
***Taq* I** (65°C)	EN-142S	3,500 units	25 €
	EN-142L	17,500 units	100 €
***Xba* I**	EN-143S	3,500 units	25 €
	EN-143L	17,500 units	100 €

Enzyme Finder

Enzyme available from Jena Bioscience | Isoschizomer available from Jena Bioscience | Neoschizomer available from Jena Bioscience

Enzyme	Cleavage Site 5 –> 3	JBS enzyme
***Aat* I**	AGG↓CCT	*Sse*B I
***Acc* III**	T↓CCGGA	*Bse*A I
***Acc*113 I**	AGT↓ACT	*Sca* I
***Acc*65 I**	G↓GTACC	{*Kpn* I}
***Afa* I**	GT↓AC	*Rsa* I
***Afl* II**	C↓TTAAG	*Msp*C I
***Age* I**	A↓CCGGT	*Csp*A I
***Ajn* I**	↓CCWGG	{*Bse*B I}
***Alu* I**	AG↓CT	*Alu* I
***Alw*44 I**	G↓TGCAC	*Apa*L I
***Apa*L I**	G↓TGCAC	*Apa*L I
***Asi*A I**	A↓CCGGT	*Csp*A I
***Asp*718 I**	G↓GTACC	{*Kpn* I}
***Asp*S9 I**	G↓GNCC	*Psp*P I
***Asu* II**	TT↓CGAA	*Asu* II
***Asu*NH I**	G↓CTAGC	*Nhe* I
***Bam*H I**	G↓GATCC	*Bam*H I
***Ban* III**	AT↓CGAT	*Bse*C I
***Bbu* I**	GCATG↓C	*Sph* I
***Bcl* I**	T↓GATCA	*Bcl* I
***Bfr* I**	C↓TTAAG	*Msp*C I
***Bfu*C I**	↓GATC	{*Dpn* I}, *Mbo* I, *Sau*3A I
***Bgl* I**	GCCNNNN↓NGGC	*Bgl* I
***Bgl* II**	A↓GATCT	*Bgl* II
***Bmt* I**	GCTAG↓C	{*Nhe* I}
***Bpu*14 I**	TT↓CGAA	*Asu* II
***Bsa*29 I**	AT↓CGAT	*Bse*C I
***Bse*118 I**	R↓CCGGY	*Bss*A I
***Bse*A I**	T↓CCGGA	*Bse*A I
***Bse*B I**	CC↓WGG	*Bse*B I
***Bse*C I**	AT↓CGAT	*Bse*C I
***Bsh*F I**	GG↓CC	*Bsh*F I
***Bsh*T I**	A↓CCGGT	*Csp*A I
***Bsi*S I**	C↓CGG	*Bsi*S I
***Bsp*106 I**	AT↓CGAT	*Bse*C I
***Bsp*119 I**	TT↓CGAA	*Asu* II
***Bsp*13 I**	T↓CCGGA	*Bse*A I
***Bsp*143 I**	↓GATC	{*Dpn* I}, *Mbo* I, *Sau*3A I
***Bsp*19 I**	C↓CATGG	*Nco* I
***Bsp*68 I**	TCG↓CGA	*Nru* I
***Bsp*AN I**	GG↓CC	*Bsh*F I
***Bsp*D I**	AT↓CGAT	*Bse*C I
***Bsp*E I**	T↓CCGGA	*Bse*A I
***Bsp*T I**	C↓TTAAG	*Msp*C I

Enzyme	Cleavage Site 5 –> 3	JBS enzyme
***Bsp*T104 I**	TT↓CGAA	*Asu* II
***Bsp*X I**	AT↓CGAT	*Bse*C I
***Bsr*F I**	R↓CCGGY	*Bss*A I
***Bss*A I**	R↓CCGGY	*Bss*A I
***Bss*H I**	C↓TCGAG	*Sla* I
***Bss*T1 I**	C↓CWWGG	*Sty* I
***Bst*2U I**	CC↓WGG	*Bse*B I
***Bst*98 I**	C↓TTAAG	*Msp*C I
***Bst*B I**	TT↓CGAA	*Asu* II
***Bst*E II**	G↓GTNACC	*Bst*E II
***Bst*EN II**	↓GATC	{*Dpn* I}, *Mbo* I, *Sau*3A I
***Bst*KT I**	GAT↓C	{*Dpn* I}, {*Mbo* I}, {*Sau*3A I}
***Bst*MA I**	CTGCA↓G	*Pst* I
***Bst*MB I**	↓GATC	{*Dpn* I}, *Mbo* I, *Sau*3A I
***Bst*N I**	CC↓WGG	*Bse*B I
***Bst*O I**	CC↓WGG	*Bse*B I
***Bst*P I**	G↓GTNACC	*Bst*E II
***Bst*SN I**	TAC↓GTA	*Sna*B I
***Bsu*15 I**	AT↓CGAT	*Bse*C I
***Bsu*R I**	GG↓CC	*Bsh*F I
***Bsu*TU I**	AT↓CGAT	*Bse*C I
***Cci*N I**	GC↓GGCCGC	*Not* I
***Cfr*10 I**	R↓CCGGY	*Bss*A I
***Cfr*13 I**	G↓GNCC	*Psp*P I
***Cfr*42 I**	CCGC↓GG	*Sgr*B I
***Cfr*9 I**	C↓CCGGG	{*Sma* I}
***Cla* I**	AT↓CGAT	*Bse*C I
***Csp*45 I**	TT↓CGAA	*Asu* II
***Csp*6 I**	G↓TAC	{*Rsa* I}
***Csp*A I**	A↓CCGGT	*Csp*A I
***Dpn* I**	GA↓TC	*Dpn* I, {*Mbo* I}, {*Sau*3A I}
***Dpn* II**	↓GATC	{*Dpn* I}, *Mbo* I, *Sau*3A I
***Ecl*136 II**	GAG↓CTC	{*Sst* I}
***Eco*105 I**	TAC↓GTA	*Sna*B I
***Eco*130 I**	C↓CWWGG	*Sty* I
***Eco*147 I**	AGG↓CCT	*Sse*B I
***Eco*32 I**	GAT↓ATC	*Eco*R V
***Eco*91 I**	G↓GTNACC	*Bst*E II
***Eco*ICR I**	GAG↓CTC	{*Sst* I}
***Eco*O65 I**	G↓GTNACC	*Bst*E II
***Eco*R I**	G↓AATTC	*Eco*R I
***Eco*R II**	↓CCWGG	{*Bse*B I}
***Eco*R V**	GAT↓ATC	*Eco*R V
***Eco*T14 I**	C↓CWWGG	*Sty* I

Restriction Enzymes

Enzyme	Cleavage Site 5 –> 3	JBS enzyme
Erh I	C↓CWWGG	*Sty* I
Fba I	T↓GATCA	*Bcl* I
Fun II	G↓AATTC	*EcoR* I
Hae III	GG↓CC	*BshF* I
Hap II	C↓CGG	*BsiS* I
Hind III	A↓AGCTT	*Hind* III
Hinf I	G↓ANTC	*Hinf* I
Hpa I	GTT↓AAC	*Hpa* I
Hpa II	C↓CGG	*BsiS* I
Kpn I	GGTAC↓C	*Kpn* I
Kpn2 I	T↓CCGGA	*BseA* I
Ksp I	CCGC↓GG	*SgrB* I
Ksp22 I	T↓GATCA	*Bcl* I
KspA I	GTT↓AAC	*Hpa* I
Kzo9 I	↓GATC	{*Dpn* I}, *Mbo* I, *Sau3A* I
Mbo I	↓GATC	{*Dpn* I}, *Mbo* I, *Sau3A* I
Mro I	T↓CCGGA	*BseA* I
MroN I	G↓CCGGC	{*Nae* I}
Msp I	C↓CGG	*BsiS* I
MspC I	C↓TTAAG	*MspC* I
Mva I	CC↓WGG	*BseB* I
Nae I	GCC↓GGC	*Nae* I
Nco I	C↓CATGG	*Nco* I
Nde II	↓GATC	{*Dpn* I}, *Mbo* I, *Sau3A* I
NgoM IV	G↓CCGGC	{*Nae* I}
Nhe I	G↓CTAGC	*Nhe* I
Not I	GC↓GGCCGC	*Not* I
Nru I	TCG↓CGA	*Nru* I
Nsp V	TT↓CGAA	*Asu* II
Pae I	GCATG↓C	*Sph* I
PaeR7 I	C↓TCGAG	*Sla* I
Pal I	GG↓CC	*BshF* I
Pce I	AGG↓CCT	*SseB* I
Pdi I	GCC↓GGC	*Nae* I
Pho I	GG↓CC	*BshF* I
PinA I	A↓CCGGT	*CspA* I
Psp124B I	GAGCT↓C	*Sst* I
Psp6 I	↓CCWGG	{*BseB* I}
PspA I	C↓CCGGG	{*Sma* I}

Enzyme	Cleavage Site 5 –> 3	JBS enzyme
PspE I	G↓GTNACC	*BstE* II
PspG I	↓CCWGG	{*BseB* I}
PspP I	G↓GNCC	*PspP* I
Pst I	CTGCA↓G	*Pst* I
Pvu II	CAG↓CTG	*Pvu* II
Rsa I	GT↓AC	*Rsa* I
Sac I	GAGCT↓C	*Sst* I
Sac II	CCGC↓GG	*SgrB* I
Sal I	GTCGAC	*Sal* I
Sau3A I	↓GATC	{*Dpn* I}, *Mbo* I, *Sau3A* I
Sau96 I	G↓GNCC	*PspP* I
Sca I	AGT↓ACT	*Sca* I
Sfi I	GGCCNNNN↓NGGCC	*Sfi* I
Sfr274 I	C↓TCGAG	*Sla* I
Sfr303 I	CCGC↓GG	*SgrB* I
Sfu I	TT↓CGAA	*Asu* II
SgrB I	CCGC↓GG	*SgrB* I
Sla I	C↓TCGAG	*Sla* I
Sma I	CCC↓GGG	*Sma* I
SnaB I	TAC↓GTA	*SnaB* I
SpaH I	GCATG↓C	*Sph* I
Sph I	GCATG↓C	*Sph* I
SseB I	AGG↓CCT	*SseB* I
Ssp I	AAT↓ATT	*Ssp* I
Sst I	GAGCT↓C	*Sst* I
Stu I	AGG↓CCT	*SseB* I
Sty I	C↓CWWGG	*Sty* I
Taq I	T↓CGA	*Taq* I
Tli I	C↓TCGAG	*Sla* I
Vha464 I	C↓TTAAG	*MspC* I
Xba I	T↓CTAGA	*Xba* I
Xho I	C↓TCGAG	*Sla* I
Xma I	C↓CCGGG	{*Sma* I}
XmaC I	C↓CCGGG	{*Sma* I}
Zho I	AT↓CGAT	*BseC* I
Zrm I	AGT↓ACT	*Sca* I

- Single Letter Code: R = A or G, Y = C or T, M = A or C, K = G or T, S = C or G, W = A or T, H = A or C or T, B = C or G or T, V = A or C or G, D = A or G or T, N = A or C or G or T
- Isoschizomers have same recognition sequence and cutting pattern.
- Neoschizomers (same recognition sequence but different cutting pattern) are indicated with brackets {enzyme}.

Buffer Guide

Restriction Enzyme	JBS Reaction Buffer	Reaction Conditions[1]		Enzyme activity (%)					Alternative Reaction Buffers	
		min. Time	Temp.	B1	B2	B3	B4	B5	Fermentas	NEB
***Alu* I**	B1	5 min.	37°C	100	100	75	10–25	75	Buffer B	NEBuffer 2
***ApaL* I**	B1	15 min.	37°C	100	100	10	<10	10–25	Buffer B	NEBuffer 2
***Asu* II**	B2*	5 min.	37°C	75	100	50–75	25	50	Buffer G	NEBuffer 2
***BamH* I**	*Bam*H I Buffer	5 min.	37°C	75	75–100	100	50–75	75	Buffer O	NEBuffer 3
***Bcl* I**	B2	5 min.	50°C	10–25	100	75	50–75	10–25	Buffer G	NEBuffer 2
***Bgl* I**	*Bgl* I Buffer	5 min.	37°C	10–25	75–100	75–100	75–100	50	Buffer O	NEBuffer 3
***Bgl* II**	B3	5 min.	37°C	10	75	100	75–100	10	Buffer O	NEBuffer 3
***BseA* I**	*Bse*A I Buffer	5 min.	55°C	10	50	75–100	50–75	10	Buffer O	NEBuffer 3
***BseB* I**	B2	5 min.	60°C	10–25	100	50	25–50	<10	Buffer G	NEBuffer 2
***BseC* I**	B3	5 min.	55°C	10	50	100	75–100	50	Buffer O	NEBuffer 3
***BshF* I**	B5	5 min.	37°C	50–75	75–100	75	50–75	100	Buffer Tango™	NEBuffer 4
***BsiS* I**	*BsiS* I Buffer	5 min.	55°C	25	50	25	10–25	100	Buffer Tango™	NEBuffer 4
***BssA* I**	*Bss*A I Buffer	5 min.	65°C	10	25	75	50	25	Buffer O	NEBuffer 3
***BstE* II**	*Bst*E II Buffer	5 min.	60°C	50	50 – 75	75 – 100	50	75	Buffer O	NEBuffer 3
***CspA* I**	*Csp*A I Buffer	5 min.	37°C	50	<10	<10	<10	<10	Buffer Ecl136 II	NEBuffer 1
***Dpn* I**	*Dpn* I Buffer	5 min.	37°C	75–100	75 – 100	50 – 75	10	75 – 100	Buffer Tango™	NEBuffer 4
***EcoR* I**	*EcoR* I Buffer	5 min.	37°C	25–50	50–75	75	50–75	75	Buffer Tango™	NEBuffer *EcoR* I
***EcoR* V**	B2	15 min.	37°C	10–25	100	50	<10	75	Buffer G	NEBuffer 2
***Hind* III**	B2	5 min.	37°C	25–50	100	10–25	10–25	50	Buffer G	NEBuffer 2
***Hinf* I**	B3	5 min.	37°C	10–25	50	100	75–100	50	Buffer O	NEBuffer 3
***Hpa* I**	B5	5 min.	37°C	25–50	10–25	10–25	10–25	100	Buffer Tango™	NEBuffer 4
***Kpn* I**	*Kpn* I Buffer	5 min.	37°C	75–100	25–50	<10	<10	50	Buffer B	NEBuffer 2
***Mbo* I**	*Mbo* I Buffer	5 min.	37°C	50 – 100	50 – 100	50 – 100	50	50 – 100	Buffer B	NEBuffer 2
***MspC* I**	B4	5 min.	37°C	<10	25–50	75–100	100	50	Buffer O	NEBuffer 3
***Nae* I**	B1	5 min.	37°C	100	25–50	25	<10	50	Buffer B	(NEBuffer 4)
***Nco* I**	B3*	5 min.	37°C	50–75	75–100	100	100	75	Buffer O	NEBuffer 3
***Nhe* I**	B5	5 min.	37°C	100	50 – 75	0 – 20	<10	100	Buffer Tango™	NEBuffer 4
***Not* I**	*Not* I Buffer	20 min.	37°C	<10	25–50	75 – 100	75	50	Buffer O	NEBuffer 3
***Nru* I**	*Nru* I Buffer	5 min.	37°C	<10	<10	75	50–75	10	Buffer O	NEBuffer 3
***PspP* I**	B2	5 min.	25°C	50–75	100	50	25–50	10	Buffer G	NEBuffer 2
***Pst* I**	*Pst* I Buffer	5 min.	37°C	10–25	50–75	75–100	50–75	50	Buffer O	NEBuffer 3
***Pvu* II**	B2	5 min.	37°C	25–50	100	100	25–50	50	Buffer G	NEBuffer 2
***Rsa* I**	B2	5 min.	37°C	75–100	100	50	<10	<10	Buffer G	NEBuffer 2
***Sal* I**	B4	5 min.	37°C	<10	25–50	50	100	<10	Buffer O	NEBuffer 3
***Sau3A* I**	B2	60 min.	37°C	50	100	50	<10	50	Buffer G	NEBuffer 2
***Sca* I**	*Sca* I Buffer	5 min.	37°C	<10	50–75	100	75–100	25	Buffer O	NEBuffer 3
***Sfi* I**	B2	5 min.	50°C	75–100	100	25–50	10–25	75–100	Buffer G	NEBuffer 2
***SgrB* I**	B1*	5 min.	37°C	75–100	75	50–75	25–50	<10	Buffer B	NEBuffer 2
***Sla* I**	B4	5 min.	37°C	25–50	75	75–100	100	10–25	Buffer O	NEBuffer 3
***Sma* I**	B5	5 min.	25°C	<10	<10	<10	<10	100	Buffer Tango™	NEBuffer 4
***SnaB* I**	*Sna*B I Buffer	5 min.	37°C	50–75	50	25	<10	100	Buffer Tango™	NEBuffer 1
***Sph* I**	B2	5 min.	37°C	75–100	100	50	50	50	Buffer G	NEBuffer 2
***SseB* I**	B3	5 min.	37°C	50–75	75–100	100	50–75	50	Buffer O	NEBuffer 3
***Ssp* I**	B3	5 min.	37°C	10–25	50–75	100	75–100	50	Buffer O	NEBuffer 3
***Sst* I**	B1	5 min.	37°C	100	25–50	25	<10	50	Buffer B	NEBuffer 2
***Sty* I**	B3	5 min.	37°C	25–50	75–100	100	75–100	<10	Buffer O	NEBuffer 3
***Taq* I**	*Taq* I Buffer	15 min.	65°C	10–25	50–75	75–100	50–75	50	Buffer O	NEBuffer 3
***Xba* I**	B2	5 min.	37°C	50–75	100	75	75	75	Buffer G	NEBuffer 2

- Please keep in mind that different isoschizomers with the same specificity, supplied by different suppliers, could be of distinct origin and may vary in optimal reaction conditions or other properties. For this reason we recommend the use of original Jena Bioscience reaction buffers and assay conditions to achieve best results.
- Information on commercially available restriction endonucleases: Roberts, R. J., Restriction Enzyme Database, NEB Inc., REBASE 2000 and Fermentas International Inc.

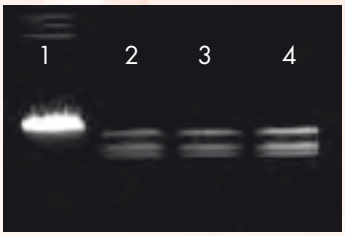
[1] Recommended amount of enzyme: One µl enzyme per µg DNA substrate

* Requires Triton X-100 for optimal activity. TX-100 is included into the supplied reaction buffer. All reactions were carried out in the presence of 100 µg/ml BSA.

Quality Standard

All restriction reactions were carried out with one µl enzyme per µg DNA substrate in the presence of BSA (100 µg/ml). Our experience indicates that it is important to use BSA in the reaction assay in order to obtain successful digestions of DNA. The presence of BSA gives complete and reproducible cleavages for a range of DNA substrates. BSA stabilizes the enzymes when digestions are perfomed for more than one hour at 37°C, since many restriction endonucleases in reaction buffers without BSA can survive at this temperature for 10-20 minutes only. Furthermore, BSA binds metal ions and other chemicals which might be present in buffers or DNA preparations, thereby inactivating restriction endonucleases.

*Bam*H I digest of lambda DNA



1 – 1 µg lambda DNA
2 – 5 min digest without BSA
3 – 30 min digest without BSA
4 – 5 min digest with BSA

Unit Definition

One unit of restriction endonuclease activity is defined as the amount of enzyme required to produce a complete digest of 1 µg of substrate DNA (or fragments) in a total reaction volume of 50 µl in 60 minutes under optimal assay conditions as stated for each restriction endonuclease.

Determination of the volume activity of restriction endonucleases

Restriction endonuclease activity assays are performed by adding different enzyme dilutions to the appropriate assay buffer containing 1 µg of substrate DNA. After a 60-minutes incubation at the appropriate temperature, the digestion is stopped and the DNA samples are visualized by agarose gel/ethidium bromide electrophoresis. The most diluted enzyme solution giving a complete digest is used to calculate the activity in units/µl.

Quality Control

The results of all quality control assays are reported on the Technical Data Sheet provided with each enzyme.

Overdigestion Assay

An overdigestion assay was used for qualitative determination of enzyme purity and for detection of nonspecific DNases. In the overdigestion assay, increasing amounts of each restriction endonuclease (usually 10, 20, 30, 40, 50 units) are added to 1 µg substrate DNA. After a 20-hours incubation under the recommended assay conditions, the maximum number of units giving a clear, sharp, normal banding pattern is determined by agarose gel/ethidium bromide electrophoresis. To pass the test, the enzyme must yield an unaltered banding pattern under conditions of up to 600-fold overdigestion (units x hours) as compared to a 2-fold digest. If enzyme exhibits "star" activity at a lower than 600-fold functional excess, the product description includes information on the functional excess at which the "star" activity does not occur.

Assay for Nonspecific Endonucleases

To assay for nonspecific endonuclease contamination, each restriction endonuclease is incubated with a supercoiled plasmid substrate lacking the recognition sequence of the restriction endonuclease. A single nonspecific nick in the RF I DNA converts it to the RF II form (nicked circle). Increasing amounts of enzyme (usually 10, 20, 30, 40, 50 units) are added to 1 µg of RF I (supercoiled form) DNA. After a 20-hours incubation under the recommended assay conditions, the two forms are distinguished on agarose gels and the conversion from RF I to RF II is determined.

Ligation and Recutting Assay

A ligation assay was used to determine the functional purity of the DNA after restriction enzyme digestion. Substrate DNA is completely digested with a 10- and 50-fold excess of the restriction endonuclease in the appropriate assay buffer, ligated with T4 DNA Ligase and recut with the same restriction enzyme. Cut, ligated and recut DNA is analyzed by agarose gel/ethidium bromide electrophoresis. A normal banding pattern indicates intact 5' and 3' termini as well as the absence of contaminating nucleases or phosphatases.

Stability

All Jena Bioscience restriction endonucleases are reassayed every 4-6 months. This process allows us to ensure full enzyme activity and optimal performance in every enzyme we ship. Due to the excellent results of this testing, we have extended the expiration dates of most of our enzymes to 18 months.

Modifying Enzymes

DNA Polymerases			
DNA Polymerase I, Klenow Fragment Fragment of DNA Polymerase I lacking 5′→3′ exonuclease activity	EN-148S	300 units	25 €
	EN-148L	1,500 units	100 €
DNA Polymerase I, Klenow Fragment, 3′→5′ exo⁻ Fragment of DNA Polymerase I lacking 5′→3′ and 3′→5′ exonuclease activity	EN-151S	200 units	25 €
	EN-151L	1,000 units	100 €
Reverse Transcriptases			
M-MLV Reverse Transcriptase (RNase H⁻) *Reverse Transcriptase*	PCR-501S	10,000 units	95 €
	PCR-501L	50,000 units	380 €
HIV-1 RT Human Immunodeficiency Virus 1 Reverse Transcriptase	PR-351	10 µg	220 €
HIV-1 RT, p51 subunit Human Immunodeficiency Virus 1 Reverse Transcriptase	PR-353	10 µg	150 €
HIV-1 RT, p66 subunit Human Immunodeficiency Virus 1 Reverse Transcriptase	PR-354	10 µg	150 €
HIV-2 RT Human Immunodeficiency Virus 2 Reverse Transcriptase	PR-352	10 µg	220 €
Ligases			
T4 DNA Ligase *E. coli* lambda lysogen NM 989	EN-149S	15,000 units	25 €
	EN-149L	75,000 units	100 €
Alkaline Phosphatases			
Alkaline Phosphatase, Calf Intestinal (CIP) from calf intestinal mucosa	EN-161S	500 units	40 €
	EN-161L	2,500 units	160 €
Nucleotide Kinases			
T4 dNMP Kinase, T4 deoxy-Nucleotide Monophosphate Kinase Bacteriophage T4, recombinant, *E. coli*	PR-340	10,000 units	180 €
Nucleases			
DNase Af, thermostable DNase from *Archaeoglobus fulgidus*, recombinant, *E. coli*	EN-158S	1 mg	90 €
	EN-158L	5 mg	360 €
RNase T1 from *Aspergillus oryzae*, recombinant, *E. coli*	EN-154S	200 kunits	90 €
	EN-154L	1,000 kunits	360 €
RNase TA engineered, recombinant, *E. coli*	EN-156S	1000 units	90 €
	EN-156L	5,000 units	360 €
Exonuclease III *E. coli*, recombinant, *E. coli*	EN-157S	30 kunits	90 €
	EN-157L	150 kunits	360 €
Exo / S1 Kit, Exonuclease III / S1 Nuclease Kit *E. coli* (ExoIII), *Aspergillus oryzae* (S1 Nuclease), recombinant, *E. coli*	EN-159	10,000 / 1,000 units	140 €
Topoisomerases			
Topo I Human DNA Topoisomerase I, wild type	PR-735	2 µg	180 €
Topo I, several domains available Human DNA Topoisomerase I	www.jenabioscience.com	2 µg	180 €

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