

# NEB

# expressions

a scientific update



50<sup>th</sup> Anniversary Golden Jubilee Edition I

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# Celebrating 50 YEARS of Passion for Science

## Celebrating 50 years of Passion for Science

Since our establishment in 1974, New England Biolabs has been different. From our founding principles – placing the advancement of science and stewardship of the environment as our highest priorities – to our unique corporate culture, NEB's philosophy can be distilled down to three core values: passion, humility, and being genuine. As we reflect on the last 50 years and look toward the future, we remain steadfast in our commitment to uphold the principles that inspired our inception, which guided us through expansion, innovation, and global growth, all while empowering the creative spirit of scientific inquiry.

### The early years and founding vision

In 1972, a scientist named Don Comb left his associate professorship in the Biochemistry Department at Harvard Medical School – disenthralled with the traditional avenues of securing research funding and the rigidity of academia. Don had a penchant for asking big questions. He left academia with the goal of bringing together like-minded scientists to form a cooperative company that would provide essential tools for molecular biologists. Further, the company would use its revenue to fund independent research projects, an idea that was unprecedented at the time. And thus, in 1974 Biolabs was founded – soon to be known as New England Biolabs (NEB) – with the goal of enabling life science research, both within and outside the company.

In the early days, NEB focused on providing high-quality restriction enzymes. In 1972, Richard Roberts of Cold Spring Harbor purified some of the first restriction enzymes. In 1975, he became the Scientific Advisor for NEB – suggesting enzymes for manufacturing and then testing the first lots for quality. NEB became the first commercial source for restriction enzymes, which

quickly emerged as a critical component in the recombinant DNA revolution. Don's approach was deeply rooted in principles that prioritized product performance and innovation. However, his vision extended beyond mere business success; he was determined to channel profits into research on neglected tropical diseases, an area often overlooked by mainstream funding. His provocative curiosity, boundless enthusiasm, and staunch commitment to environmental conservation have left an indelible mark, inspiring many who worked with him and for him. Don's unconventional yet highly effective approach to running a company put people and passion for science at the forefront, sidelining traditional priorities of process and profit. His ethos was characterized by providing high-quality reagents at fair prices, the seamless integration of basic and applied research, and a strong emphasis on protecting the planet while advancing scientific endeavors.

Don hired scientists who were passionate and curious. He encouraged them to explore their own research interests while carrying out their job responsibilities. In doing so, NEB became experts in the functionality and biophysical properties of a wide range of enzyme activities, resulting in an in-

“ Don's generosity and the faith that he had in each employee resulted in a family-like culture, where everyone has a voice and all employees feel valued. ”

~ Jim Ellard, former CEO, New England Biolabs



© Robert Bensen Photography

depth understanding of product performance. This enabled the collegial exchange of ideas, protocols and techniques with customers – the beginning of a more personal approach to technical support that continues to this day.

Don Comb served as CEO until 2005, and his devotion to the advancement of science, stewardship of the environment, and altruistic philanthropy continues to be a priority today. Our employees are encouraged to pursue their passions, whether it be getting involved in groundbreaking research, helping out at a local science fair, or sharing ideas to improve the sustainability of our business practices – everyone feels a responsibility to each other and the community.

### Expansion and innovation lay the groundwork for growth

While NEB was founded on a portfolio of restriction endonucleases, in-house research led to extensive insights into enzyme functionality. A notable milestone was the use of recombinant DNA technology to clone and express enzymes in *E. coli*. This breakthrough improved enzyme quality and yield, the latter prompting Don to reassess product pricing to ensure affordability for all researchers, once again reflecting his commitment to facilitating research.

Our dedication to research, rooted in our “by scientists for scientists” philosophy, not only drives the development of new products, but also uniquely positions us as both developers and users of our products. This is critical for staying connected to our customers and helping to drive scientific breakthroughs. Over the years, NEB scientists have discovered a wide range of enzyme specificities that act on both DNA and RNA. We have also extended our product offerings into areas related to PCR, gene expression, sample preparation for next generation sequencing, synthetic biology and RNA analysis. This expansion reflects our commitment to innovation and is a response to the diverse needs of the scientific community.

### Empowering creativity in scientific inquiry

As has already been stated, Don Comb founded the company with the vision of using profits to fund a basic research program – a philosophy that continues to this day. Currently, scientists comprise 25% of our organization. There are ~30 research labs at our campuses in MA, USA, engaged in basic and applied research across various scientific disciplines. Our research divisions encompass RNA, Biochemistry and Molecular Biology, Molecular Genetics and Genomics, and Applied Molecular Biology. Here, we provide an environment where researchers can pursue their own ideas and actively collaborate with other scientists in academia and industry.

Our Applications & Product Development scientists are grouped into 10 teams – five that align with our product portfolio (Cloning and Nucleic Acid Purification, DNA Amplification, Next Generation Sequencing, RNA & Genome Editing, and Protein Expression), and then an additional five that are focused on foundational activities that benefit scientists across the organization. These teams are involved in Assay Development, Custom Product Development, Bioinformatics, Lyophilization Sciences, and Organic Synthesis.

In the early days, Don traveled extensively and saw firsthand the suffering caused by various neglected tropical diseases (NTDs) – a term given to 17 understudied diseases that are collectively the second leading cause of disability worldwide after mental health issues. Don used what he knew best – science – to help make a difference. He established the NEB parasitology research program almost 45 years ago, and this work continues to forge new ground in an otherwise overlooked health crisis.

Our scientists are passionate about sharing their findings through publications, web tools and innovative products. To date, our scientists have authored or co-authored over 1,490 publications, and often present their findings at conferences and events worldwide.

“ You never know which scientist is going to make a discovery. You never know which enzyme will be part of a new technology. So we allow scientists to take those opportunities to develop and advance into areas we’ve never dreamt about. “

~ Andy Bertera, Executive Director of Marketing and Sales, New England Biolabs

### Setting the standard for environmental stewardship

Don Comb incorporated his passion for the environment into his personal life and professional role at NEB. His commitment to environmental sustainability was evident in selecting the location of NEB’s headquarters in Ipswich, MA, which emphasized minimal ecological impact. The sprawling 160-acre campus blends mixed forest, wetlands, and agricultural land; it offers public hiking trails, and provides a diverse wildlife habitat.

In 2003, after acquiring the property, an architectural competition was held to design a new 140,000-square-foot state-of-the-art laboratory facility. A unique stipulation was the preservation of three Copper Beech trees, demonstrating our commitment to integrating nature with development. This led to innovative solutions like underground retaining walls to protect the trees’ root systems and prevent soil compaction during construction.

The main laboratory facility is LEED® (Leadership in Energy and Environmental Design) and ISO 14001 certified, which dictates a framework of strict, environmentally-sound regulations. Additionally, NEB’s campus hosts a unique Solar Aquatics Wastewater System®, which mimics natural processes found in streams and wetlands to treat the campus’ wastewater, ensuring the water discharged is cleaner than when it was sourced.

Don’s vision for environmental stewardship led NEB to become a pioneer in eco-friendly practices within the biotechnology industry, setting a precedent for others. As NEB continues to grow, it remains committed to decisions that protect the environment, underscoring the importance of corporate responsibility in preserving the planet for future generations.

### Establishing a worldwide presence

Over five decades, NEB has expanded our global footprint with wholly-owned subsidiaries in countries that include Australia, Canada, China, France, Germany, Japan, New Zealand, Singapore, South Korea, and the UK. This enables us to provide rapid product delivery and direct, in-time-zone support. Each subsidiary is more than a distribution hub, it’s a center of technical expertise. Our focus on hiring and extensively training



NEB Headquarters in Ipswich, MA, is LEED-certified and designed with sustainability in mind.

highly qualified teams ensures that we're not just distributing products, but also providing valuable expertise and knowledge locally. This extensive distribution network supports our goals of being closer to our customers, understanding their needs, and delivering unparalleled value and support.

### Supporting customers developing diagnostics and therapeutics: GMP-grade\* and lyophilization capabilities

NEB has enjoyed decades-long sustainable growth by meeting the research community's needs with our commitment to research, comprehensive technical support, and a growing portfolio of cutting-edge life science reagents. In 2018, not far from our main campus in Ipswich, MA, NEB opened a state-of-the-art 43,000 sq. ft. production facility to manufacture GMP-grade materials. Products manufactured in this facility comply with the ISO 13485:2016 Quality Management Standards, addressing bioburden and endotoxin specifications on products, certified animal-free origin and manufacturing process, qualified equipment, utilities and QC test methods. This controlled manufacturing process allows us to support customers requiring a higher level of quality. It also enabled us to scale our production during the COVID-19 pandemic to meet the needs of customers developing diagnostic assays and vaccine developers.

Our response to the COVID-19 pandemic was multifaceted. Firstly, to protect our employees, our scientists were called to action and developed a saliva-based, 30-minute, colorimetric isothermal amplification-based COVID-19 assay. Also, as SARS-CoV-2 variants arose, we realized the impact this may have on amplification-based assays. To address this, our bioinformatics and bench scientists developed an open-access web tool for monitoring variants and their impact on primer design.

Meanwhile, our support for customers developing essential reagents for molecular diagnostic assays and mRNA vaccines became more apparent. To further strengthen our capabilities, we acquired Fluorogenics (now New England Biolabs

“ Even as we have matured as an organization, we've purposefully maintained the ability to pivot and be flexible as we handle and support not just customers who are super small and nimble, but also those who are large and extremely sophisticated. ”

~ Nicole Nichols, Executive Director, Applications & Product Development, New England Biolabs

Lyophilization Sciences™), a company with expertise in lyophilization. By integrating their lyophilization capabilities with our own expertise in enzyme manufacturing and assay development, we further solidified our ability to provide customized solutions to meet the growing global demand for diagnostic assays. This commitment is especially crucial in environments where traditional diagnostic facilities may be unavailable, emphasizing the need for simplified, robust, and stable assays that can make a real difference.

### Sustaining our core values throughout global growth and a changing of the guard

In 2005, Don retired as CEO but remained active in his research. He was succeeded by Jim Ellard, who had joined the company in 1983 as a summer intern. During Jim's 17-year period as CEO, NEB experienced substantial growth, expanding into new markets and establishing a significant global presence. This period saw the establishment of several global subsidiaries and distributors, the launch of the GMP-grade manufacturing facility, and the expansion of NEB's product portfolio and technical capabilities to support a wide variety of applications that impact human health. Jim's tenure, marked by strategic expansion and adept navigation through the challenges of the pandemic, was instrumental in shaping the company's global stature.

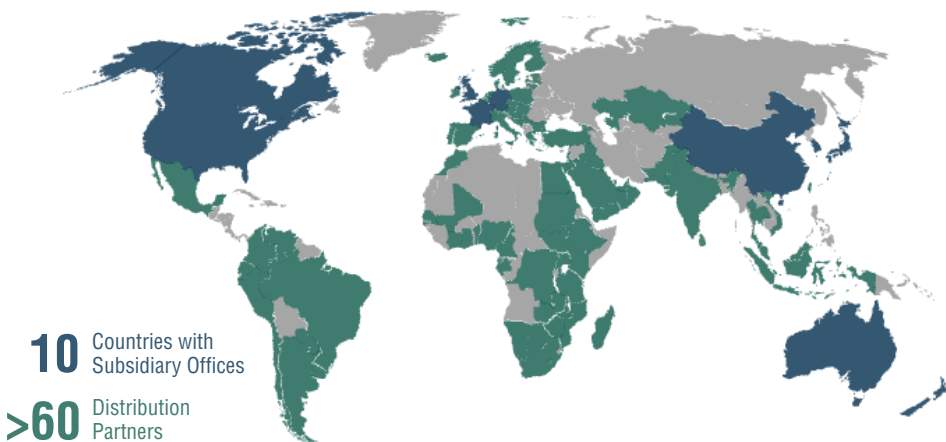
In 2022, Jim transitioned the company's leadership to Sal Russello, a seasoned member of the NEB community – with 16 years at the company and a 5-year tenure as Director of the OEM and Customized Solutions Department. Sal, recognized for his passion and dedication akin to Jim's, places significant emphasis on fostering meaningful connections and teamwork, aligning with NEB's core values. His dynamic approach focuses on building trust and collaborative relationships both within the organization and with our customers.

Under Sal's leadership, NEB is charting a course that not only continues to inspire and support scientific innovation but also prioritizes sustainability and community engagement at both local and global levels. We are excited to support both academic and industry researchers with innovative new products, and by bolstering our support for customers developing therapeutics and diagnostic assays. This strategy includes expanding the company's global footprint and our ability to scale manufacturing to meet our customers' needs – all while steadfastly adhering to our foundational values that were instilled by Don Comb.

“ NEB's goal is to continue to build a sustainable business focused on enabling the scientific community, fostering curiosity, and giving back – to those closest to us and the world around us. ”

~ Sal Russello, CEO, New England Biolabs

\*"GMP-grade" is a branding term NEB uses to describe products manufactured or finished at NEB's Rowley facility. The Rowley facility was designed to manufacture products under more rigorous infrastructure and process controls to achieve more stringent product specifications and customer requirements. Products manufactured at NEB's Rowley facility are manufactured in compliance with ISO 9001 and ISO 13485 quality management system standards. However, at this time, NEB does not manufacture or sell products known as Active Pharmaceutical Ingredients (APIs), nor does NEB manufacture its products in compliance with all of the Current Good Manufacturing Practice regulations.



NEB's global distribution network ensures rapid access to NEB's products as well as valuable expertise and knowledge.

# Celebrating 50 Years of Passion for Science

Throughout the year, we will be hosting a series of events to celebrate our customers. To learn more, visit [neb.com/NEBturn50](http://neb.com/NEBturn50)

## WHERE IN THE *world* IS NEB?

We are setting out on a 50-stop world tour and want you to join us!

Visit our scientists and staff at our booths, tabletops and events to learn about new products, pick up samples and literature, and provide your feedback on how we are doing. We are looking forward to seeing you!



Featured locations include:

**JAN 09** **Assises de Génétique**  
Paris, France

**FEB 01** **Genomics India**  
New Delhi, India

**MAR 15** **CACLP Expo**  
Chongqing, China

**MAR 21** **10<sup>th</sup> ITOC**  
Munich, Germany

**MAR 25** **Society of Virology**  
Vienna, Austria

**MAR 27** **Forum Labo Lyon**  
Lyon, France

**APR 08** **Microbiology Society Annual Conference** | Edinburgh, UK

**APR 09** **Analytica**  
Munich, Germany

**APR 27** **ECCMID**  
Barcelona, Spain

**MAY 28** **KSBMB International Conference**  
Busan, Republic of Korea

**JUN 01** **ESHG**  
Berlin, Germany

**JUN 02** **VAAM & DGHM**  
Wuerzburg, Germany

**JUN 20** **Salon du Laboratoire Pasteur**  
Paris, France

**JUN 26** **RNA Society of Japan**  
Tokyo, Japan

**JUL 28** **ADLM**  
Chicago, IL, USA

**SEP 03** **QMB**  
Queenstown, New Zealand

**SEP 22** **Biomolecular Horizons**  
Melbourne, Australia

**NOV 11** **MEDICA**  
Duesseldorf, Germany

Visit [neb.com/worldtour](http://neb.com/worldtour) to find out where we will be throughout 2024.

Please celebrate NEB's Golden Jubilee with us:

## Watch out for free raffle tickets and win\*!

In celebration of our Golden Anniversary, we're thrilled to introduce the "Golden Butterfly" QR code promotion. This is your chance to be part of a unique and exciting adventure! We are giving out free raffle tickets (boxcards) with unique, one-time QR codes/promo codes that open the door to a world of prizes!

### How It Works:

Between April 1<sup>st</sup> and June 30<sup>th</sup> 2024, you have a multitude of options to receive your raffle tickets. You can request them from your local distributor or salesperson, they may be inserted in your shipment, included in requested NEB brochures or you can get them at trade shows including the events of the NEB 50-stop world tour.

Simply keep an eye out for the raffle tickets, scan the QR code and find out if you're one of the lucky winners!



Learn more on  
[neb-online.eu/  
GoldenJubilee](http://neb-online.eu/GoldenJubilee)

### Prize drawing includes\*\*:

**For the Toy Aficionado:** Get creative with our lab-based "Lego" brick building sets – perfect for the young at heart.

**Wildlife Supporters:** Embrace a cuddly stuffed toy animal, and we will support the WWF.

**Lab/Office Essentials:** Upgrade your lab/office with our custom gear which includes the NEBTimer, microfuge rack, water bath floaty and more.

\* This campaign is restricted to certain countries and void where raffles and prize draws are prohibited or restricted by federal, state, provincial or local laws or regulations or guidelines of authorities/institutions/employers. Any legal recourse is excluded. Please contact your local distributor ([www.neb.com/international-support](http://www.neb.com/international-support)) to learn about its availability in your region.

\*\* Value of prizes below 30 €. Prizes may be subject to change. For full terms & conditions, please visit [www.neb-online.eu/GoldenJubilee](http://www.neb-online.eu/GoldenJubilee)

Streamlined  
for speed

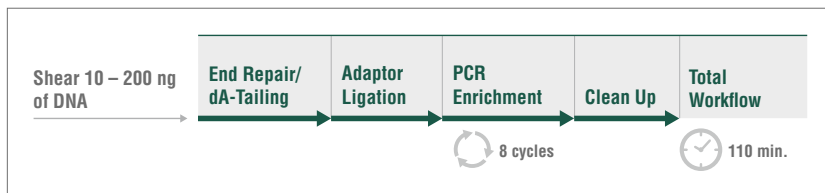


# Let NEBNext UltraExpress speed up your NGS library prep

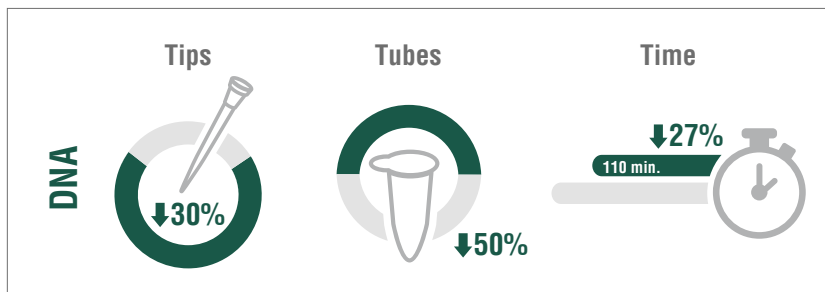
Sometimes speed is required to set you apart from the pack. The **NEBNext UltraExpress DNA, FS DNA and RNA Library Prep Kits** have been carefully optimized for speed, while providing the high yields and high quality that you've come to rely on. Each kit has a single-condition protocol, with fixed universal adaptor concentration and number of PCR cycles, for the ultimate in streamlining. With fewer workflow and cleanup steps and automation-friendly transfer volumes, the kits were built for ease of use and automation compatibility. And, they do this all while reducing consumables waste and associated cost, making your discoveries at the bench greener and more economic.

## NEBNext UltraExpress workflow overview – Save time, have fewer steps and reduce consumables waste.

### NEBNext UltraExpress DNA Kit (for fragmented DNA):



Compared to the corresponding NEBNext Ultra II DNA Kit, you are saving:



## Advantages

- Faster workflows:
  - DNA and FS DNA library prep:** < 2 hours
  - RNA library prep:** 3 hours (or 3:30 hours and 5 hours when including poly(A) enrichment or rRNA depletion respectively)
- Fewer steps & less consumables waste
- Wide input range:
  - DNA:** 10 – 200 ng DNA (mechanically sheared)
  - FS DNA:** 10 – 200 ng DNA (intact)
  - RNA:** 25 – 250 ng RNA (total)
- A single protocol for all inputs
- Automation compatibility



Request your free NEBNext UltraExpress sample at **NEBNext.com** or contact your local distributor.

## Ordering Information

PRODUCT	NEB #	SIZE
NEBNext UltraExpress DNA Library Prep Kit	E3325S/L	24/96 rxns
NEBNext UltraExpress FS DNA Library Prep Kit	E3340S/L	24/96 rxns
NEBNext UltraExpress RNA Library Prep Kit	E3330S/L	24/96 rxns



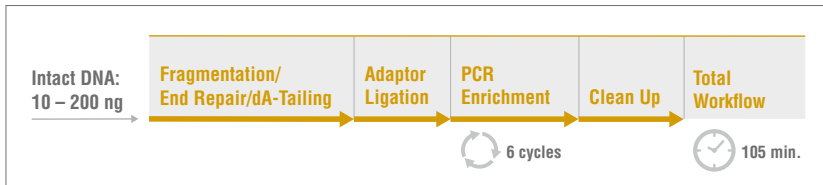
In addition to NEB's 50<sup>th</sup> anniversary, we're also celebrating  
**15 years of NEBNext!**

# Streamlined for speed



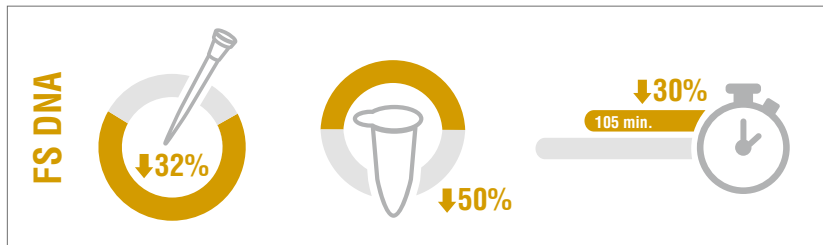
## CONTINUED: NEBNext UltraExpress workflow overview

### NEBNext UltraExpress FS DNA Kit (for intact DNA):

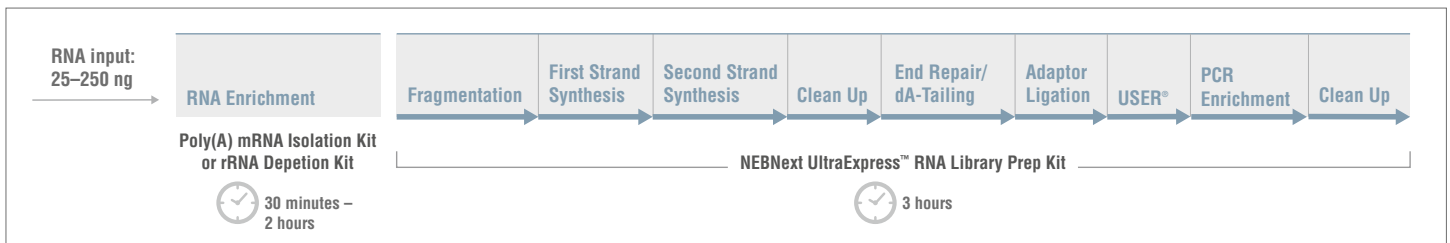


Request your free NEBNext UltraExpress sample at [NEBNext.com](http://NEBNext.com) or contact your local distributor.

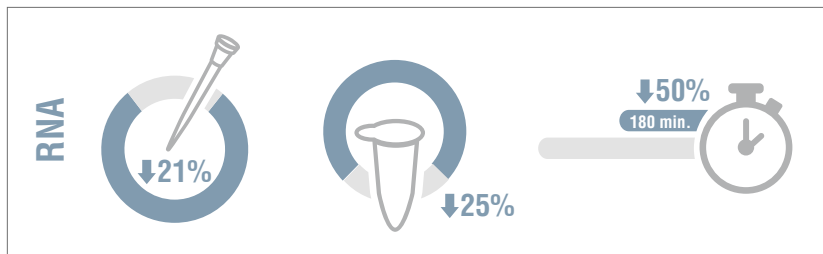
Compared to the corresponding NEBNext Ultra II DNA FS Kit, you are saving:



### NEBNext UltraExpress RNA Kit (for total RNA):



Compared to the corresponding NEBNext Ultra II Directional RNA Kit, you are saving:



“ Protocols designed to save time usually only save 20-30 minutes. The NEBNext UltraExpress RNA Library Prep protocol saved us just over an hour in processing time. This is quite significant. We were especially impressed with the new clean-up approach that resulted in squeaky clean libraries. ”

~ Director, Large Sequencing Core

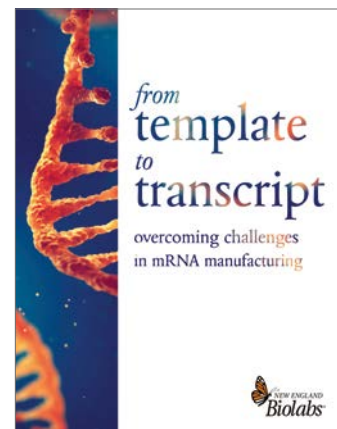


# Supporting Advances in Diagnostic and Therapeutic Innovation and Manufacturing

At NEB, we view every challenge as an opportunity. We know you are pushing the boundaries of what is known today to develop innovative solutions for diagnosing and treating disease. Whether you are launching your first product or expanding an existing portfolio, accessing innovative and critical materials at the quality and scale you need is an important step in bringing your assay or treatment to market.

## Partner with NEB and gain access to the following:

- 50 years of experience in enzymology and reagent manufacturing
- A collaborative relationship where we take time to understand your goals, anticipate your needs, and continuously innovate products you may need in the future
- The ability to manufacture products at the scale you need (ml to 1000's of L) and in a variety of formats, including glycerol-free, lyophilized and lyo-compatible
- ISO 9001- and 13485-certified manufacturing facilities and global warehousing capabilities
- A purpose-built, 43,000 sq ft. production facility for GMP-grade\* enzyme manufacturing
- Direct access to our OEM & Customized Solutions Team who is committed to your growth and success



Visit [neb.com/innovation](https://www.neb.com/innovation) to learn more



Download our latest eBook to learn how to overcome challenges with mRNA manufacturing  
[neb.com/forms/ebook-template-to-transcript](https://www.neb.com/forms/ebook-template-to-transcript)

\*\*GMP-grade\* is a branding term NEB uses to describe products manufactured or finished at NEB's Rowley facility. The Rowley facility was designed to manufacture products under more rigorous infrastructure and process controls to achieve more stringent product specifications and customer requirements. Products manufactured at NEB's Rowley facility are manufactured in compliance with ISO 9001 and ISO 13485 quality management system standards. However, at this time, NEB does not manufacture or sell products known as Active Pharmaceutical Ingredients (APIs), nor does NEB manufacture its products in compliance with all of the Current Good Manufacturing Practice regulations.





# Monarch Nucleic Acid Purification

## Make the better choice and migrate to Monarch

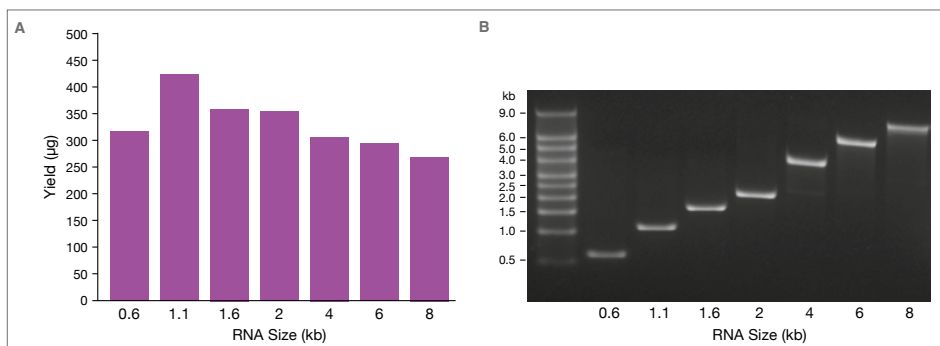
Monarch Nucleic Acid Purification Kits are the perfect complement to many molecular biology workflows. Recover pure, intact DNA and RNA in minutes with our fast, user-friendly protocols and optimized buffer systems, and focus your time on the experiments that will drive your research forward. Isolate nucleic acids from biological samples, clean up DNA and RNA from enzymatic reactions, extract DNA fragments from gels, or purify plasmids.

Monarch kits are all designed with sustainability in mind; whenever possible, kits and components are made with significantly less plastic and are packaged with responsibly sourced, recyclable packaging. Furthermore, plastic recovered during the manufacture of Monarch columns is used to manufacture other plastic-based NEB products.

## Featured Product: Monarch RNA Cleanup Kits

The Monarch RNA Cleanup Kits provide a fast and simple silica spin column-based solution for RNA cleanup and concentration after any enzymatic reaction (including *in vitro* transcription, DNase I treatment, capping and labeling) and after other purification methods such as phenol/chloroform extraction. The Monarch RNA Cleanup Kits are available in 3 different binding capacities: 10 µg (NEB #T2030), 50 µg (NEB #T2040) and 500 µg (NEB #T2050). Each kit contains unique columns, all designed to prevent buffer retention and ensure no carryover of contaminants, enabling low-volume elution of highly-pure RNA.

**The Monarch RNA Cleanup Kit (500 µg) is suitable for cleaning up large quantities (> 250 µg) of RNA from *in vitro* transcription reactions**



A. RNA transcripts of varying sizes (0.6–8 kb) were synthesized using the HiScribe T7 Quick High Yield RNA Synthesis Kit (NEB #E2050). 40 µl of each *in vitro* transcription (IVT) reaction was cleaned up using the Monarch RNA Cleanup Kit (500 µg) (NEB #T2050). RNA yields were calculated from the resulting A260, measured using a Nanodrop spectrophotometer and ranged from 268–425 µg of RNA per IVT reaction. B. RNA integrity (200 ng/lane) was assessed on a 1% agarose-TBE gel stained with SYBR Gold.

## Designed with sustainability in mind



No excessive packaging



Reduced lab waste



Flexible purchasing options



Sustainable & recyclable packaging



For more information, visit [nebmonarch.com](https://www.nebmonarch.com)

## Ordering Information

PRODUCT	NEB #	SIZE
Monarch RNA Cleanup Kit (10 µg)	T2030	10/100 preps
Monarch RNA Cleanup Kit (50 µg)	T2040	10/100 preps
Monarch RNA Cleanup Kit (500 µg)	T2050	10/100 preps

# Shout out for the 2024 Passion in Science Awards®

As a kickoff to the 2024 Passion in Science Awards, Andy Bertera, NEB's Executive Director of Marketing & Sales, answers some questions about how these awards came about and what they mean to NEB and the scientific community.

## Q: Why did NEB decide to launch the Passion in Science Awards?

A: When NEB turned 40, we put a lot of thought into whether this was a milestone that we should celebrate and, if we were to celebrate it, how we could do it in a meaningful way. We wanted to do something that reflected the values that NEB embraces, and that influence how we think and operate. With this in mind, we decided to hold an awards ceremony that celebrated our many customers who share the same values as NEB – people who are working to make the world a better place. This evolved into what we now call the “Passion in Science Awards”, which proved to be an inspiring event for everyone – customers and NEB staff, alike.

## Q: How did you decide on the categories for the Passion in Science Awards?

A: The Passion in Science categories reflect NEB's core values: the knowledge that there is overlap between art and science, that we all have a duty to help fellow humans, as well as to care for and protect our environment, and finally to inspire people by making scientific ideas and concepts accessible to everyone, not just our fellow scientists.

## Q: What is the application process like?

A: You can start by visiting our website, [NEBPassionInScience.com](http://NEBPassionInScience.com). From there, customers can apply directly, or nominate a colleague. The application process is relatively straightforward, but does require that the project(s) be explained in some detail. Applications are then reviewed by a panel of NEB scientists. The Winner(s) will be selected on the basis of how well they have impacted and enhanced the value of the category for which they have submitted their Award entry.

## Q: What does it mean for NEB and the scientific community to continue to hold the Passion in Science Awards in the future?

A: By celebrating the scientists who embrace the same fundamental principles that guide NEB, we hope to be able to highlight how the research community can make a real difference in the world; differences that go well beyond their contributions to science – acts of kindness, solving social problems, and reducing our environmental footprint, to name but a few.



Andy Bertera, NEB's Executive Director of Marketing & Sales

## Q: What do the winners receive?

A: We invite the winners to our Ipswich, MA, USA campus, where they are involved in two days of presentations and discussions related to their inspiring work. The winners also receive \$1,000 to donate to a charity of their choice. We also try to spread the word about the great work the winners are doing through our website, social media, and our catalog.

## Q: How do I nominate someone who has a passion for science?

A: To nominate someone you know who has a passion for science, visit [NEBPassionInScience.com](http://NEBPassionInScience.com). Here, you can also learn more about the four award categories and check out our FAQs for more details.



Applications for the Passion in Science Awards will be accepted **April 1<sup>st</sup>** through **June 1<sup>st</sup>, 2024**. Be sure to apply or nominate a colleague!

**PASSION IN  
SCIENCE  
AWARDS®**

# 50 YEARS of Social Responsibility & Sustainability

At NEB, we are motivated by a set of core, foundational values that are as true today as they were when the company was founded in 1974:

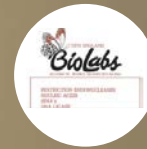
- Science should be used to expand our understanding of the world around us
- Scientists can also act as humanitarians
- All species, great and small, benefit when we care for the environment
- Great science is fundamentally creative and artistic, and changes the way we see and experience the world

While passion for science helps us to drive discovery, we continue to be guided by our responsibility to each other and our community, both locally and globally, to work towards a more just world. As such, our offices in the US and around the world are committed to the same core values and sustainability practices.



To learn more, visit  
[neb.com/about-neb/corporate-social-responsibility-and-sustainability](http://neb.com/about-neb/corporate-social-responsibility-and-sustainability)

DRIVING SUSTAINABILITY FOR 50 YEARS



US Styrofoam recycling program begins  
est. 1976

First New England Biolabs catalog printed on 100% recycled paper  
est. 1975



Plastic and can recycling begins  
est. 1989

New England Biolabs Foundation  
est. 1982



Wastewater treatment facility  
est. 2004

Polystyrene, paper, glass, batteries & electronics recycling  
est. 1992



Composting on NEB campus begins  
est. 2008

LEED® certification  
est. 2007



Carbon-neutral catalogs and brochures in Europe since 2013

ISO 14001 Certification, MA "Green Binnie" and Sustainable Design Award  
est. 2009



Solar panels help power our main US campus  
est. 2017

Monarch® kits released  
est. 2016



100% recyclable cold-chain packaging  
est. 2019

Partnership with Reforest the Tropics  
est. 2019



B Corp® Certification  
est. 2019

# Celebrating 50 Years of Passion for Science



## Defining the industry since 1974: Unsurpassed performance and quality of NEB Restriction Enzymes

Back in 1974, NEB was the first ever company to offer Restriction Enzymes commercially. Since its humble beginning, NEB has shaped modern molecular biology as well as scientific progress by supplying the largest selection of restriction enzymes to the life science community. Ever since, NEB is offering the highest quality, unsurpassed performance and extremely easy-to-use products.

Today, NEB's restriction enzymes are used in many different applications including traditional cloning and modern Golden Gate assemblies, in droplet digital PCR, chromatin conformation capture and optical mapping. Whenever you need restriction enzymes, turn to the wise choice – NEB!



### Your Advantages:

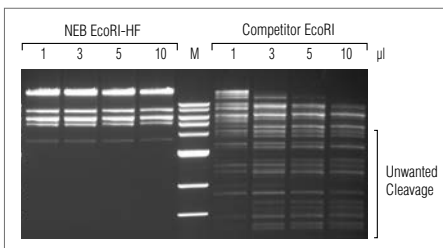
- Largest Selection of restriction enzymes globally – Choose from **265 enzymes**
- **Largest Selection of Type IIS enzymes** for Golden Gate Assemblies
- Easy double digests: **210 enzymes are 100 % active** in one single BSA-free rCutSmart Buffer
- **Rekombinant Albumin (animal-free)** in all reaction buffers and most storage buffers (product dependent) making NEB's enzymes the BSA-free choice
- **No buffer change needed** after digestion as many modifying enzymes incl. T4 DNA Ligase are also 100 % active in rCutSmart Buffer
- **Dramatically reduced star activity** with High Fidelity (HF) enzymes
- Optional **5-15 min Time-Saver** digests with over 180 enzymes
- **Free Purple Loading dye** for Agarose Gels included (product dependent)



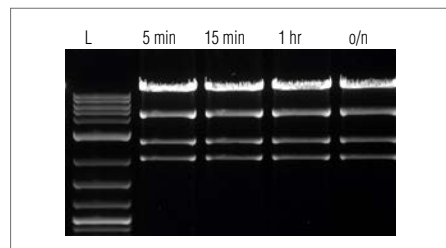
Request a free copy of the Poster "**Performance Chart for Restriction Enzymes**" from your local distributor.



Benefit from our special price campaign on **page 16**.



**HF enzymes outperform the competition:**  
*EcoRI-HF (NEB #R3101) exhibits no star activity in overnight digests, even when used at higher concentrations. 50 µl reactions were set up using 1 µg of Lambda DNA, the indicated amount of enzyme and the recommended reaction buffer. Reactions were incubated overnight at 37°C. Marker M is the 1 kb DNA Ladder (NEB# N3232). For illustration purposes, the part of the gel below approx. 1.2 kb is not shown.*



**Optional Time-Saver digest:**  
*pXba DNA was digested with EcoRV-HF (NEB #R3195) according to the recommended protocol. Lane L is the 2-Log DNA Ladder (NEB #N3200). Complete digestion, free of unwanted star activity, is seen whether incubated for 5–15 minutes, 1 hour or overnight. For illustration purposes, the part of the gel below approx. 0.9 kb is not shown.*



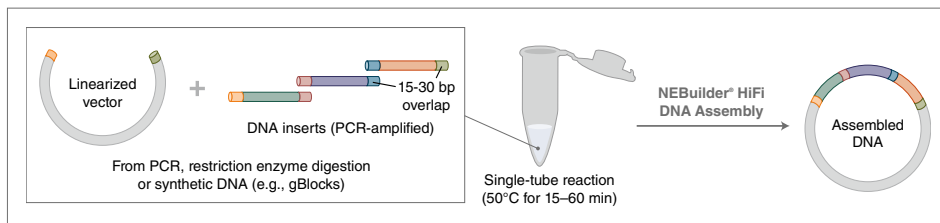
**No UV-shadow and sharp bands:**  
*Lane 1: UV shadow typical for conventional loading dyes (e.g. Bromophenol-Blue); Lane 2: NEB's purple loading dye as supplied with all top selling restriction enzymes*

# Clone with Confidence



## NEBuilder HiFi DNA Assembly

NEBuilder HiFi DNA Assembly enables virtually error-free joining of DNA fragments, even those with 5'- and 3'-end mismatches. Available with and without competent *E. coli*, this flexible kit enables simple and fast seamless cloning, utilizing a new proprietary high-fidelity polymerase. Find out why NEBuilder HiFi is the next generation of DNA assembly and cloning.



### Ordering Information

PRODUCT	NEB #	SIZE
NEBuilder HiFi DNA Assembly Master Mix	E2621S/L/X	10/50/250 rxns
NEBuilder HiFi DNA Assembly Cloning Kit	E5520S	10 rxns
NEBuilder HiFi DNA Assembly Bundle for Large Fragments	E2623S	20 rxns

### Advantages

- Enjoy simple and fast seamless cloning in as little as 15 minutes.
- Use one system for both „standard-size“ cloning and larger gene assembly products, up to 12 fragments.
- DNA can be used immediately for transformation or as template for PCR or RCA.
- Adapts easily for multiple DNA manipulations, including site-directed mutagenesis.
- No licensing fees from NEB for NEBuilder products.

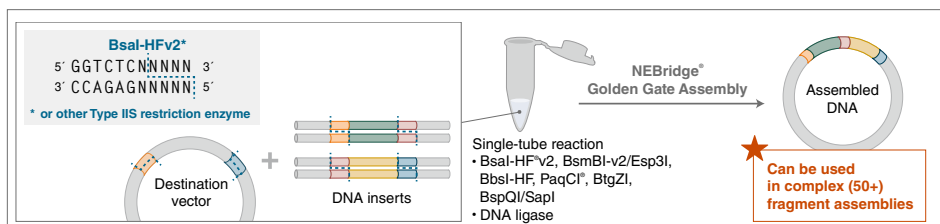


Explore the wise choice at  
[nebuilder.neb.com](http://nebuilder.neb.com)

## NEBridge Golden Gate Assembly

Golden Gate Assembly is a molecular DNA assembly technique that utilizes simultaneous digestion with Type II restriction enzymes (which cleave outside their non-palindromic recognition sequence) and ligation by a DNA ligase to enable the scarless, ordered assembly of multiple fragments.

With constant advances in both the development of new enzymes, tools and research on maximizing enzyme functionality (e.g., ligase fidelity), NEB is the industry leader in pushing the limits of Golden Gate Assembly and related methods.



### Ordering Information

PRODUCT	NEB #	SIZE
NEBridge Golden Gate Assembly Kit (BsmBI-v2)	E1602S/L	20/100 rxns
NEBridge Golden Gate Assembly Kit (Bsal-HFv2)	E1601S/L	20/100 rxns
NEBridge Ligase Master Mix	M1100S/L	50/250 rxns

### Advantages

- Assemble multiple fragments (2–50+) in order, in a single reaction.
- Perform single insert cloning in just 5 minutes using our fast protocols.
- Use with a broad range of fragment sizes (<100 bp to >15 kb).
- Experience high efficiency, even with regions of high GC content and areas of repeats.
- Clone seamlessly, with no scars remaining after assembly.
- Generate libraries with high efficiencies.



Get started designing primers at  
[goldengate.neb.com](http://goldengate.neb.com)



## Choose NEB Competent Cells for your cloning

NEB's growing line of competent cells includes several popular strains for cloning and protein expression, in addition to strains with unique properties, including fast colony growth, tight control of expression and disulfide bond formation. Our cloning strains include derivatives of the industry standards, DH5 $\alpha$ <sup>™</sup> and DH10B<sup>™</sup>. NEB Turbo is unique to NEB, and produces visible colonies after only 6.5 hours of growth. NEB's *dam-/dcm-* strain enables Dam and Dcm methylation-free plasmid growth. NEB Stable is recommended in most difficult cloning experiments. Our cells are all extensively tested for phage resistance, antibiotic resistance and sensitivity, blue/white screening and transformation efficiency. High efficiency, 5-minute transformation and electroporation protocols are provided, when applicable.

	NEB 5-alpha Competent <i>E. coli</i> (NEB #C2987)	NEB Turbo Competent <i>E. coli</i> (NEB #C2984)	NEB 5-alpha F' I <sup>+</sup> Competent <i>E. coli</i> (NEB #C2992)	NEB 10-beta Competent <i>E. coli</i> (NEB #C3019)	<i>dam-/dcm-</i> Competent <i>E. coli</i> (NEB #C2925)	NEB Stable Competent <i>E. coli</i> (NEB #C3040)
<b>FEATURES</b>						
Versatile	•					•
Fast growth (< 8 hours)		•				
Toxic gene cloning			•			•
Large plasmid/BAC cloning				•		
Dam/Dcm-free plasmids					•	
Retroviral/lentiviral vector cloning						•
RecA-	•		•	•		•
<b>FORMATS</b>						
Chemically competent	•	•	•	•	•	•
Subcloning	•					
96-well plate format	•			•		
384-well plate format	•					
8-tube strips	•					

### Advantages

- High transformation efficiencies.
- Compatible with NEBuilder HiFi DNA Assembly and Gibson Assembly reactions, as well as ligation reactions.
- Strains also available for cloning toxic genes.
- All strains are free of animal products and T1 phage resistant.
- Media and control plasmid is included.
- Choose from a variety of convenient formats.
- Bulk formats and custom packaging are available.

Other strains are available upon request. For more information, contact [custom@neb.com](mailto:custom@neb.com).

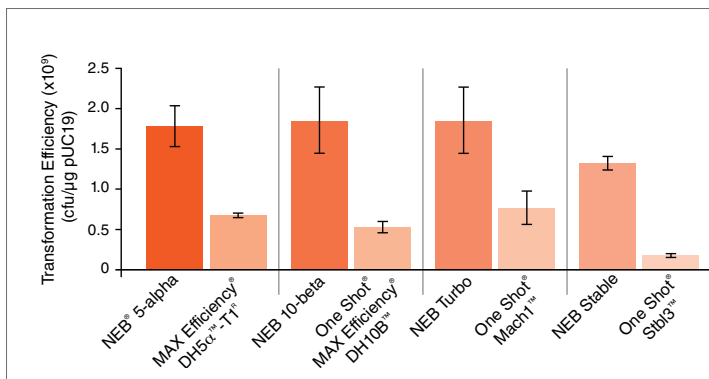


Learn more & visit:

[neb.com/  
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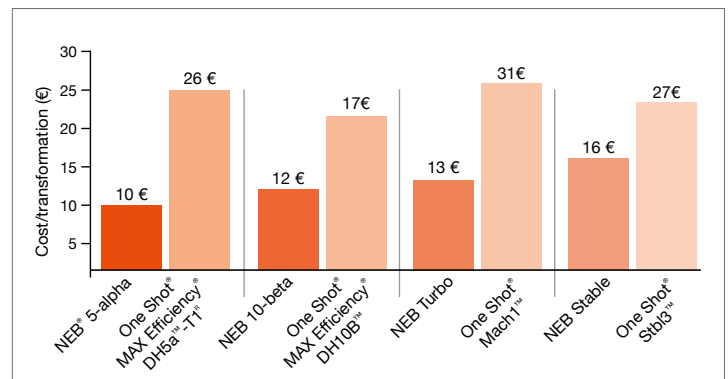
### Benefit from high transformation efficiencies

Transformation efficiencies were compared using manufacturers' recommended protocols. Values shown are the average of triplicate experiments.



### Take advantage of the low cost per transformation

Calculations were based on published list prices as of 02/2024 and recommended transformation volumes. Prices may differ in various European countries.





## Enhancing Transformation Efficiency

Transformation efficiency is defined as the number of colony forming units (cfu) that would be produced by transforming 1 µg of plasmid into a given volume of competent cells. However, 1 µg of plasmid is rarely transformed. Instead, efficiency is routinely calculated by transforming 100 pg – 1 ng of highly purified supercoiled plasmid under ideal conditions. Transformation Efficiency (TE) is calculated as:  $TE = \text{Colonies}/\mu\text{g}/\text{Dilution}$ . Efficiency calculations can be used to compare cells or ligations. Our recommended protocols and tips to help you achieve best results are presented here:

### Transformation Tips

#### Thawing

- Cells are best thawed on ice.
- DNA should be added as soon as the last trace of ice in the tube disappears.
- Cells can be thawed by hand, but warming above 0°C decreases efficiency.

#### Incubation of DNA with Cells on Ice

- Incubate on ice for 30 minutes. Expect a 2-fold loss in TE for every 10 minutes this step is shortened.

#### Heat Shock

- Both temperature and time are specific to the transformation volume and vessel. Typically, 30 seconds at 42°C is recommended.

#### Plating

- Selection plates can be used warm or cold, wet or dry with no significant effects on TE.
- Warm, dry plates are easier to spread and allow for the most rapid colony formation.

#### Outgrowth

- Outgrowth at 37°C for 1 hour is best for cell recovery and for expression of antibiotic resistance. Expect a 2-fold loss in TE for every 15 minutes this step is shortened.
- Use NEB 10-beta/Stable Outgrowth Medium for 10-beta and Stable Competent *E. coli*. Use SOC for all other strains.
- Outgrowth medium gives 2-fold higher TE than LB medium.
- Incubation with shaking or rotation results in 2-fold higher TE.

#### DNA

- DNA should be purified and resuspended in water or Tris-EDTA Buffer.
- Up to 10 µl of DNA from a ligation mix can be used with only a 2-fold loss of efficiency.
- Purification by either a spin column or phenol/chloroform extraction and ethanol precipitation is ideal.

- The optimal amount of DNA is lower than commonly recognized. Using clean, supercoiled pUC19, the efficiency of transformation is highest in the 100 pg – 1 ng range. However, the total colonies which can be obtained from a single transformation reaction increase up to about 100 ng.

#### DNA Contaminants to avoid

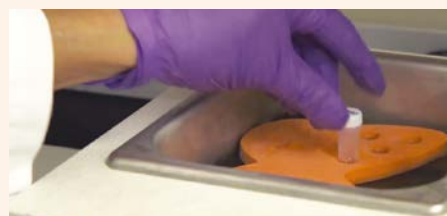
Contaminant	Removal Method
Detergents	Ethanol precipitate
Phenol	Extract with chloroform and ethanol precipitate
Ethanol or Isopropanol	Dry pellet before resuspending
PEG	Column purify or phenol/chloroform extract and ethanol precipitate
DNA binding proteins (e.g., ligase)	Column purify or phenol/ chloroform extract and ethanol precipitate

### Featured Videos

Find these and other helpful tips for using NEB competent cells at [www.neb.com/CloningCompCells](http://www.neb.com/CloningCompCells)



How to perform a transformation with NEB competent cells



Tips for successful transformations with NEB competent cells

### Online Tools



#### NEBcloner

Visit [NEBcloner.neb.com](http://NEBcloner.neb.com) for help with choosing the right competent cells for your experiment



#### NEBioCalculator

Visit [NEBioCalculator.neb.com](http://NEBioCalculator.neb.com) for help with conversions and calculations

# Celebrating 50 Years of Passion for Science



## 3 for 2

Celebrate NEB's Golden Jubilee with us:

## Buy 3 NEB restriction enzymes and pay for only 2!

(offer closes June 30<sup>th</sup>, 2024)

Order three restriction enzymes of choice and state the **promotion code "3 for 2"** when ordering!

You will pay for only two restriction enzymes at list price! The third restriction enzyme (i.e. the cheapest) is for free!\*

Learn more about the benefits of NEB Restriction Enzymes & Smarter Cloning on page 12-13.



For more details contact your local distributor or visit [www.neb.com/international-support](http://www.neb.com/international-support)

\* No other discounts apply. Ask your local distributor for details!



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50  
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