Oral Drug Delivery Solutions

An integrated portfolio of functional polymers, delivery technologies and services to release the true value of your oral solid dosage forms

EVONIK
POWER TO CREATE

Make Evonik Your Competitive Advantage

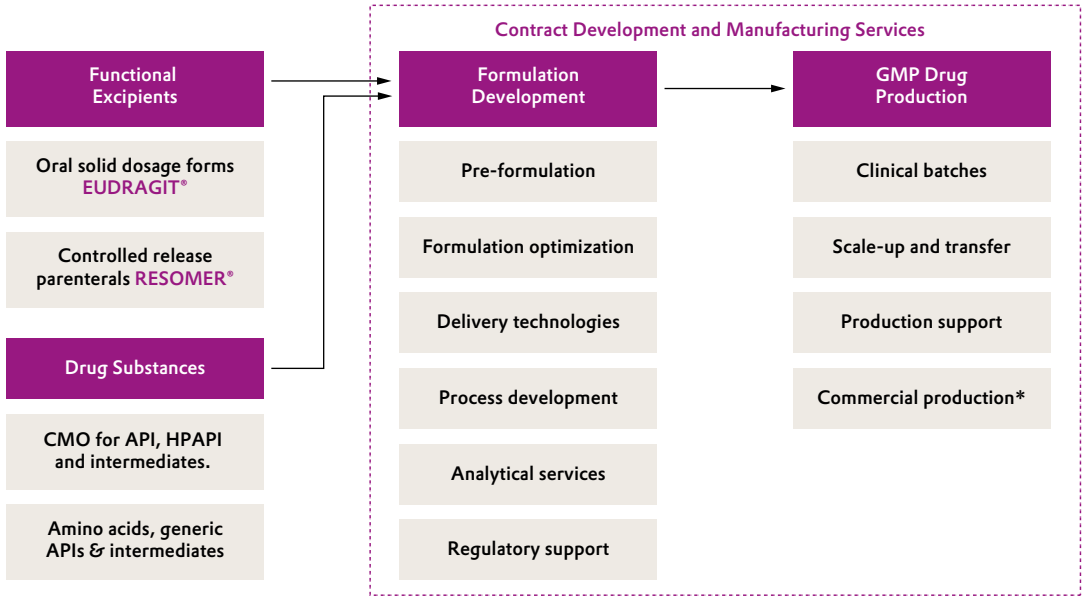
Evonik is one of the world's leading specialty chemical companies. In 2017, our more than 36,000 employees produced sales of €14.4 billion and an operating result (EBITDA) of €2.36 billion. We hold market leading positions in 80 % of our businesses, and are active across more than 100 countries and 175 sites globally.

Evonik Health Care is a global strategic partner for advanced drug delivery solutions. We combine highly versatile platforms of functional excipients for oral and parenteral dosage forms, with innovative technologies and best-in-class formulation development, manufacturing and regulatory services.

Pharmaceutical companies worldwide leverage our distinctive products and value-adding services to enhance drug effectiveness, reduce project complexity, increase speed to market and strengthen supply security.

By helping to transform your APIs into high-performance medicines, we can become Your Competitive Advantage.

YOUR GLOBAL PARTNER FOR ADVANCED DRUG DELIVERY



*Parenteral drug products

RELEASE THE TRUE VALUE OF YOUR ORAL SOLID DOSAGE FORMS

1

EUDRAGIT® functional polymers

The versatility and reliability to protect the API, boost drug performance and reduce formulation risk

2

Delivery Technologies

Differentiated solutions for modified release to enhance drug efficacy and generate superior targeting outcomes

3

Formulation Services

Best-in-class services to reduce project complexity from concept to the final dosage form to increase speed to market

4

Clinical Supply and Transfer

High-quality GMP clinical production, robust scale-up and transfer processes, and production support and trouble-shooting

5

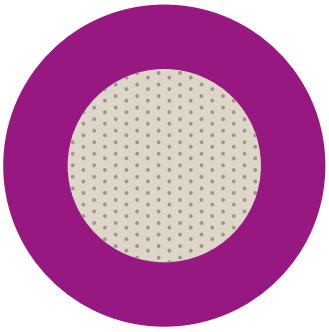
Regulatory Support

Leverage the worldwide monograph status of our excipients and local market expertise for regulatory 'peace-of-mind'

UNRIVALLED VERSATILITY TO UNLOCK THE POTENTIAL OF YOUR API

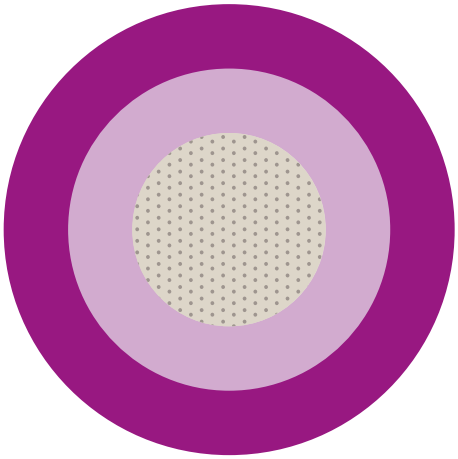
Our platform of polymers can be used individually or in combination to match virtually any target release profile

Single layers

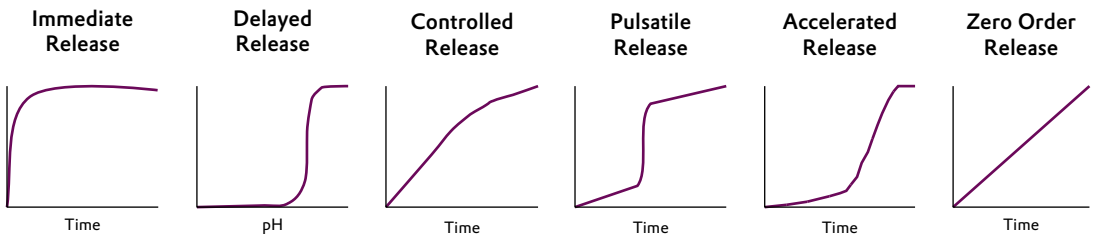


- Single EUDRAGIT® polymer
- Combination of EUDRAGIT® polymers
- Combination of EUDRAGIT® polymers and other excipients or substances

Multiple layers



- Single EUDRAGIT® polymer per layer
- Combination of EUDRAGIT® polymers and other excipients or substances
- Inert core with combination of EUDRAGIT® polymers and API layer



THE FLEXIBILITY TO ADDRESS SPECIFIC FUNCTIONALITY REQUIREMENTS

THE EUDRAGIT® ADVANTAGE

- A proven record for safety and performance spanning more than 60 years
- Ideal for all oral solid dosage forms including multiparticulates and matrix tablets
- Easy to handle and compatible with all relevant process technologies
- Consistent quality and global supply security at any clinical or commercial scale
- Unparalleled expertise across coatings, formulations and finished dosage forms

IMMEDIATE RELEASE

Protect the Drug. Boost Patient Compliance.

- Neutral in taste and smell to mask API bitterness or unpleasant odours
- Smooth, glossy surfaces as thin as 10–20 µm to improve swallowability
- Reliable protection and stability for APIs sensitive to light, moisture or oxygen
- Insoluble in saliva and readily soluble in the stomach for improved absorption
- Custom-made, easy-to-mix powder blends for rapid suspension preparation

DELAYED RELEASE

Protect the API. Avoid Discomfort. Improve Absorption.

- A broad, easy-to-combine enteric platform to achieve a specific dissolution pH
- Highly effective and stable polymers for precise targeting and rapid dissolution
- Well-defined solutions to protect the gastric mucosa from aggressive actives
- Strong expertise in safeguarding the transit of APIs sensitive to gastric fluid
- Options to improve coating productivity and reduce process and cleaning time

SUSTAINED RELEASE

Optimize Drug Effectiveness. Improve Patient Compliance.

- Sustained, modulated or custom release profiles controlled by diffusion barriers
- Multiple combination options to precisely control passage through the GIT
- Proficient in daily dosage forms including multiparticulates and matrix tablets
- Insoluble with pH-independent swelling and options for high or low permeability
- Options to improve coating productivity and reduce process and cleaning time

SOLUBILITY ENHANCEMENT

Increase bioavailability. Address poor solubility.

- Highly specialized in solid dispersions, API and silica technologies
- Well-defined, flexible processes for hot melt extrusion and spray drying
- Robust thermoplastic properties, high thermostability and miscibility
- Predictive systems to select the best carrier excipient and process parameters
- Various downstreaming options to improve dosage forms and speed to market

Innovative, highly flexible technologies to enhance the oral delivery of small molecules and biologics

- Addressing specific unmet medical and regulatory needs for advanced formulations
- Patent protected and available for narrow licensing to generate powerful brand differentiation
- Readily combined with EUDRAGIT® polymers for specific targeting of small molecules or biologics
- Commercially viable with in vitro and in vivo studies and robust, scalable specifications
- Designed for seamless integration with standard equipment and process technologies

OPTIMIZE DRUG EFFICACY WITH SUPERIOR TARGETING OUTCOMES

Alcohol Resistance

EUDRATEC® ADD

A robust, dual-layer coating technology providing protection for multiparticulates and tablets with up to 40 % alcohol

Oral Delivery of Biologics and Peptides

EUDRATEC® PEP

A modular toolbox for multiparticulates with specific functionalities in each microparticle for oral bioavailability and dose convenience

Accelerated Release in the Upper Small Intestine

DUOCOAT®

A dual-coating of enteric polymers with an inner layer customized for rapid dissolution in the upper small intestine

Time-controlled Release

EUDRATEC® MOD

A diffusion controlled, time-triggered system for multiparticulates to achieve pulsatile and other customized release profiles

High-Precision Colon Delivery

PHLORAL®

A single film coating with a dual action mechanism that combines a pH triggered polymer with a polysaccharide

DUOCOAT®

A dual-layer coating of enteric polymers with an inner layer customized for rapid dissolution in the ileocolonic region

EUDRATEC® COL

A dual-layer of pH triggered and time-controlled polymers for multiparticulates to boost bioavailability & reduce daily intake

Phoral® and Duocoat® are proprietary technologies from Intract Pharma Ltd.

HARNESS THE VALUE OF OUR BEST-IN-CLASS PROJECT SERVICES

1 COMPREHENSIVE SUPPORT

Extensive polymer and formulation support from the first sample to the final dosage form

2 DECADES OF TECHNICAL EXPERTISE

Projects led by scientists and pharmacists with indepth technical and scientific knowledge

3 GLOBAL LABORATORY NETWORK

Access to a dozen formulation and application labs worldwide including local onsite support

4 PROCESS TECHNOLOGY EXPERTISE

Strong capabilities across all relevant process technologies and equipment

5 SUPPORTING SCALE-UP AND LAUNCH

Broad knowledge of physiological aspects, clinical requirements and GMP scale-up

6 STRONG RECORD OF ACHIEVEMENT

Decades of commercial project success for small molecules or biologics

7 ANY ORAL SOLID DOSAGE FORM

Deep expertise across complex dosage forms including monolithics and multiparticulates customized dose forms

8 LOCAL MARKET EXPERTISE

Highly familiar with local regulatory processes and requirements

9 QUALITY BY DESIGN APPROACH

QbD principles guide each process step to reduce risk and improve speed to market

10 HPAPI AND CONTROLLED SUBSTANCES

HPAPI handling down to 1 µg/m^3 OEL with a U.S. license to handle controlled substances

CREATING EXCEPTIONAL VALUE FROM FEASIBILITY TO FINAL DOSAGE FORM

PRE-FORMULATION SERVICES	▪ Fast-track feasibility studies ▪ Rapid evaluation of polymer options ▪ Evaluation of formulation technologies (small to intermediate scale)	
FORMULATION DEVELOPMENT	▪ Technology matching to target release profile ▪ Quality by Design approach ▪ Formulation and reformulation projects	▪ Method development and validation ▪ Prototypes for stability or PK studies ▪ GMP clinical batches for PI to IIA
ANALYTICAL SERVICES	▪ Advanced analytical development methods ▪ Compendial methods and specifications ▪ Dissolution testing	▪ Assay and purity evaluation ▪ Particle size analysis ▪ Molecular weight determination ▪ Characterization technologies
PRODUCTION AND TRANSFER SUPPORT	▪ Process technology expertise GMP and non-GMP scale ▪ On-site production support and troubleshooting	▪ CMO review and recommendation for clinical and commercial scale-up ▪ Transfer to production site

OUR HIGHLY SPECIALIZED CAPABILITIES ENABLE US TO EFFICIENTLY MANAGE COMPLEX PROJECTS FOR:

- Drug types including small molecules, peptides, enzymes, nucleic acids, high potent APIs and controlled substances
- Specialized formulation areas including personalized medicine and 3D printing, pediatric and geriatric medicine, continuous manufacturing, microbiome delivery and the oral delivery of biologics
- Regulatory and lifecycle management strategies including expedited approval pathways such as 505(b)(2)

4 Clinical Supply and Transfer

FAST, FLEXIBLE AND RELIABLE CLINICAL DRUG SUPPLY

- Support for clinical phases from I to IIA at our established facility in Darmstadt, Germany
  - 135 m^2 clean room area
  - Four classified manufacturing suites
- Manufacturing operations of human investigational medicinal products for clinical trials" issued by German authorities
  - GMP system complies with EU guidelines
  - DIN EN 9001 and DIN EN ISO 14001
- Handling of HPAPI and controlled substances

Equipment	GMP Scale
Fluid bed coating	0.8 – 10 kg
Automatic capsule filling	< 3,000 capsules / hour
High-shear granulation	0.2 – 4.0 kg
Extrusion – spheronization	< 25 kg / hour
Drug layering	0.8 – 10 kg
Tablet compression	< 3,600 tablets / hour
Tablet, capsule and particle coating	0.5 – 3.5 kg
Melt extrusion	0.06 – 3 kg / hour

5 Regulatory Support

WORLDWIDE MONOGRAPH ACCEPTANCE. LOCAL MARKET EXPERTISE.

PHARMACOPOEIAL MONOGRAPHS AND DMFS

- Global acceptance of monographs for EUDRAGIT® series across key regions including U.S., EU, Japan and China
- EUDRAGIT® types detailed in Type IV U.S. DMFs
- EXCiPACT™ certificate system for audit efficiency

EXTENSIVE DOCUMENTATION SUPPORT

- Global quality systems (IPEC-GMP)
- Robust documentation to support NDAs and marketing authorizations including
  - Safety and Toxicology Packages
  - Polymer specifications
  - Letters of Authorization for DMFs
  - Detailed statements for special purposes

201807-OEX-V1

EVONIK
POWER TO CREATE

EVONIK NUTRITION & CARE GMBH
Health Care Business Line
Pharma Polymers & Services

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