

Selection guide

# Affinity chromatography columns and media



# Affinity Chromatography (AC)

Affinity chromatography separates proteins on the basis of a reversible interaction between a protein (or group of proteins) and a specific ligand attached to a chromatographic matrix. The technique is well suited for a capture or intermediate step and can be used whenever a suitable ligand is available for the protein(s) of interest. Affinity chromatography offers high selectivity, hence high resolution, and usually high capacity. Affinity chromatography is frequently used as the first step (capture step) of a two-step purification protocol, followed by a second chromatographic step (polishing step) to remove remaining impurities.

The target protein(s) is/are specifically and reversibly bound by a complementary binding substance (ligand). The sample is applied under conditions that favor specific binding to the ligand. Unbound material is washed away, and bound target protein is recovered by changing conditions to those favoring elution. Elution is performed specifically, using a competitive ligand, or non-specifically, by changing the pH, ionic strength, or polarity. Samples are concentrated during binding, and the target protein is collected in purified and concentrated form. The key stages in an affinity chromatography separation are shown in Figure 1.

Affinity chromatography is also used to remove specific contaminants. For example, Benzamidine Sepharose™ 4 Fast Flow can remove serine proteases.

## Chromatography media selection

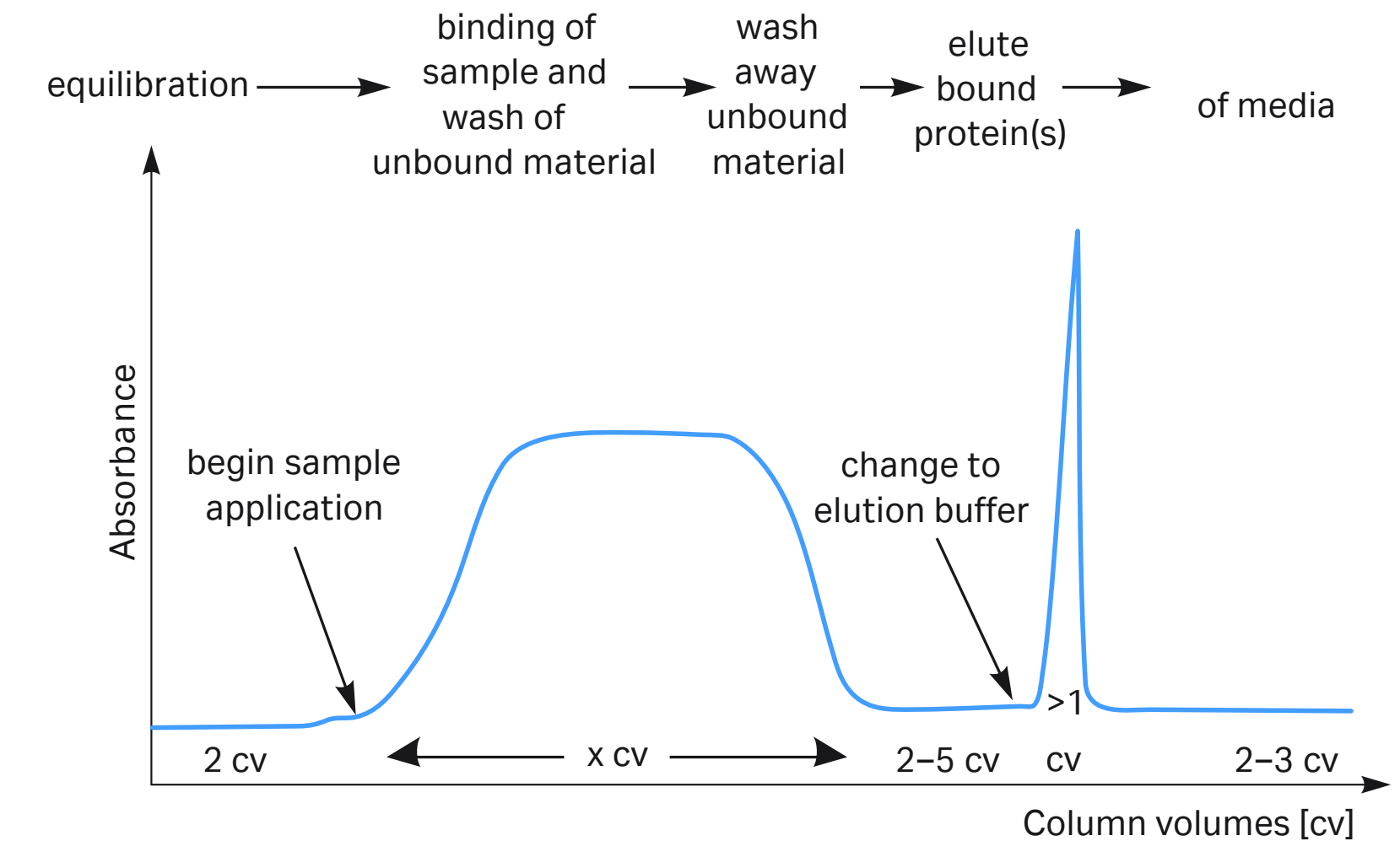
Parameters such as scale of purification and commercial availability of affinity matrices should be considered when selecting affinity media.

HiTrap™ affinity columns are ideal for method optimization or small scale purification of target proteins using well-established protocols.

HiScreen™ columns are prepacked with a range of BioProcess™ chromatography media and are designed for method optimization and parameter screening.

Affinity media can be prepared by coupling a ligand to a selected matrix. HiTrap NHS-activated HP is designed specifically to facilitate this process and is supplied with a recommended coupling procedure for coupling primary amines.

For separations of glycoproteins and polysaccharides, media screening may be required to select the correct specificity.



**Fig 1.** Typical affinity purification.



## Immunoglobulins

While protein A and protein G affinity media are similar in many respects, their specificities for IgG differ. Protein G affinity media are the better choice for general purpose capture of antibodies since they bind IgG from a broader range of eukaryotic species and bind more subclasses of IgG. Species-specific examples include stronger binding of polyclonal IgG from cow, sheep, and horse to protein G. Polyclonal rat IgG, human IgG<sub>3</sub>, and mouse IgG<sub>1</sub> are bound by protein G but not by protein A. Generally, protein G has greater affinity for IgG and minimal binding of albumin, which results in cleaner preparations and greater yield.

Conversely, protein A may be the better choice for isolating certain subclasses of IgG or for removing cross-species IgG contaminants from horse or fetal calf serum, for example.

Purification of human and mouse IgM is possible by the use of the HiTrap IgM Purification HP 1 ml column. The thiophilic adsorption medium with 2-mercaptopyridine coupled to Sepharose HP is designed for one-step purification protocols resulting in 80% to 95% pure IgM.

Purification of IgY from egg yolk is easily performed using HiTrap IgY Purification HP 5 ml column. This specially-designed medium gives over 70% purity in one step.

## Tagged proteins

Tagged recombinant proteins present many practical advantages, the single most important being simple, one-step, high-purity affinity purifications.

Purification of tagged proteins is typically based on specific interactions between the tags and ligands. Four commonly used tags are: polyhistidine (His), glutathione-S-transferase (GST), *Strep*-tag™ II, and Maltose Binding Protein (MBP). Other tags include; Protein A, calmodulin-binding peptide (CBP), and biotinylated peptide. Histidine-tagged proteins have a high selective affinity for Ni<sup>2+</sup>, Co<sup>2+</sup>, and a variety of other immobilized metal ions, while the GST tag binds to glutathione ligands coupled to Sepharose. Histidine tags are small and therefore less disruptive to the proteins on which they are attached. GST tags are larger and their removal from target proteins is often necessary.

*Strep*-tag II is a small tag of only eight amino acids. The tag binds specifically to the *Strep*-Tactin™ ligand immobilized on a Sepharose base matrix to yield pure target proteins. MBP-tagged proteins have high selectivity towards carbohydrates such as dextrin.

Cytiva offers a wide range of products for purifying histidine-, GST-, MBP-, and *Strep*-tag II-tagged proteins. For example, tagged protein purification media and prepacked columns allow rapid, one-step purification of unclarified as well as pretreated cell lysates and cell-free systems. These media and prepacked columns permit manual purification with a syringe, a centrifuge, or by gravity-flow, as well as automated purification with ÄKTA™ systems.



# Affinity Chromatography

## Prepacked columns and media for group-specific purification

| Ordering information | Product                  |                         | Binding capacity per ml chromatography medium (approx.)            | Average particle diameter µm | Maximum operating flow rate¹ | Maximum operating pressure | pH stability² |            | Application areas: purification, isolation or removal of the following substances                                                                                                                                                                                                                                                                                                                                                          |
|----------------------|--------------------------|-------------------------|--------------------------------------------------------------------|------------------------------|------------------------------|----------------------------|---------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code No.             | Prepacked columns        | Column size             |                                                                    |                              |                              |                            | Long term     | Short term |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-0412-01           | HiTrap Blue HP           | 5 × 1 ml                | 20 mg human albumin                                                | 34                           | 4 ml/min                     | 0.5 MPa, 5 bar             | 4–12          | 3–13       | Albumin, broad range of nucleotide-requiring enzymes, coagulation factors.                                                                                                                                                                                                                                                                                                                                                                 |
| 17-0413-01           |                          | 1 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 28-9782-43           | HiScreen Blue FF         | 1 × 4.7 ml              | ≥ 18 mg human albumin                                              | 90                           | 3.5 ml/min                   | 0.15 MPa, 1.5 bar          | 4-12          | 3-13       | Albumin, broad range of nucleotide-requiring enzymes, coagulation factors. Excellent for method optimization and parameter screening.                                                                                                                                                                                                                                                                                                      |
| 28-9924-74           | HiScreen Capto™ Blue     | 1 × 4.7 ml              | Approx. 25 mg human serum albumin                                  | 75                           | 4.6 ml/min                   | 0.3 MPa, 3 bar             | 2-13          | 2-13       | Capto Blue is highly chemically stable and has a more rigid agarose base matrix than Blue Sepharose 6 Fast Flow. This allows the use of faster flow rates and larger sample volumes, leading to higher throughput and improved process economy. The application area is the same as for Blue Sepharose Fast Flow (e.g., purification of albumin, enzymes including NAD+ and NADP+, coagulation factors, interferons, and related proteins) |
| 17-0406-01           | HiTrap Heparin HP        | 5 × 1 ml                | 3 mg antithrombin III                                              | 34                           | 4 ml/min                     | 0.5 MPa, 5 bar             | 5–10          | 5–10       | Antithrombin III and other coagulation factors, lipoproteins, lipases, protein synthesis factors, DNA binding proteins.                                                                                                                                                                                                                                                                                                                    |
| 17-0407-01           |                          | 1 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-0407-03           |                          | 5 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-5189-01           | HiPrep™ 16/10 Heparin FF | 1 × 20 ml               | 2 mg bovine antithrombin III                                       | 90                           | 10 ml/min                    | 0.15 MPa, 1.5 bar          | 4–12          | 4–13       | Antithrombin III and other coagulation factors, lipoproteins, lipases, protein synthesis factors, DNA binding proteins.                                                                                                                                                                                                                                                                                                                    |
| 17-5281-01           | GSTrap™ HP               | 5 × 1 ml                | > 7 mg                                                             | 34                           | 4 ml/min                     | 0.5 MPa, 5 bar             | 3–12          | 3–12       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                                                                                                                                                                                                                                                                 |
| 17-5281-05           |                          | 100 × 1 ml <sup>®</sup> |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-5282-01           |                          | 1 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-5282-02           |                          | 5 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-5282-05           |                          | 100 × 5 ml <sup>®</sup> |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 29-0486-09           | GSTrap 4B                | 1 × 1 ml                | > 25 mg                                                            | 90                           | 4 ml/min                     | 0.5 MPa, 5 bar             | 4–13          | 4–13       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                                                                                                                                                                                                                                                                 |
| 28-4017-45           |                          | 5 × 1 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 28-4017-46           |                          | 100 × 1 ml <sup>®</sup> |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 28-4017-47           |                          | 1 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 28-4017-48           |                          | 5 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 28-4017-49           |                          | 100 × 5 ml <sup>®</sup> |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-5130-02           | GSTrap FF                | 2 × 1 ml                | > 10 mg                                                            | 90                           | 4 ml/min                     | 0.5 MPa, 5 bar             | 3–12          | 3–12       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                                                                                                                                                                                                                                                                 |
| 17-5130-01           |                          | 5 × 1 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-5130-05           |                          | 100 × 1 ml <sup>®</sup> |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-5131-01           |                          | 1 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-5131-02           |                          | 5 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-5131-05           |                          | 100 × 5 ml <sup>®</sup> |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-5234-01           | GSTPrep™ FF 16/10        | 1 × 20 ml               | See GSTrap FF                                                      | 90                           | 10 ml/min                    | 0.15 MPa, 1.5 bar          | 3–12          | 3–12       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                                                                                                                                                                                                                                                                 |
| 17-0408-01           | HiTrap Chelating HP      | 5 × 1 ml                | 12 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 34                           | 4 ml/min                     | 0.5 MPa, 5 bar             | 3–13          | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions.                                                                                                                                                                                                                                              |
| 17-0409-01           |                          | 1 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-0409-03           |                          | 5 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-0409-05           |                          | 100 × 5 ml <sup>®</sup> |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-0920-03           | HiTrap IMAC HP           | 5 × 1 ml                | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 34                           | 4 ml/min                     | 0.5 MPa, 5 bar             | 3–12          | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions.                                                                                                                                                                                                                                              |
| 17-0920-05           |                          | 5 × 5 ml                |                                                                    |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |

| Ordering information | Product                               |                       | Binding capacity per ml chromatography medium (approx.)                                                                                                                                                        | Average particle diameter µm | Maximum operating flow rate¹ | Maximum operating pressure | pH stability² |            | Application areas: purification, isolation or removal of the following substances                                                                                                                                                                                                                                                                                                                                                          |
|----------------------|---------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------|----------------------------|---------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code No.             | Prepacked columns                     | Column size           |                                                                                                                                                                                                                |                              |                              |                            | Long term     | Short term |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-0921-02           | HiTrap IMAC FF                        | 5 × 1 ml              | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> )<br>25 mg (Histidine) <sub>6</sub> -tagged protein (Cu <sup>2+</sup> )<br>15 mg (Histidine) <sub>6</sub> -tagged protein (Zn <sup>2+</sup> ) | 90                           | 4 ml/min                     | 0.5 MPa, 5 bar             | 3–12          | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions.                                                                                                                                                                                                                                              |
| 17-0921-04           |                                       | 5 × 5 ml              |                                                                                                                                                                                                                |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-0921-06           | HiPrep IMAC FF 16/10                  | 1 × 20 ml             | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> )<br>25 mg (Histidine) <sub>6</sub> -tagged protein (Cu <sup>2+</sup> )<br>15 mg (Histidine) <sub>6</sub> -tagged protein (Zn <sup>2+</sup> ) | 90                           | 10 ml/min                    | 0.15 MPa, 1.5 bar          | 3–12          | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions.                                                                                                                                                                                                                                              |
| 28-9505-17           | HiScreen IMAC FF                      | 1 × 4.7 ml            | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> )<br>25 mg (Histidine) <sub>6</sub> -tagged protein (Cu <sup>2+</sup> )<br>15 mg (Histidine) <sub>6</sub> -tagged protein (Zn <sup>2+</sup> ) | 90                           | 3.5 ml/min                   | 0.5 MPa, 5 bar             | 3-12          | 2-14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions . Excellent for method optimization and parameter screening.                                                                                                                                                                                  |
| 17-5112-01           | HiTrap Streptavidin HP                | 5 × 1 ml              | Biotin > 300 nmol, 6 mg biotinylated BSA                                                                                                                                                                       | 34                           | 4 ml/min                     | 0.5 MPa, 5 bar             | 4–9           | 2–10.5     | Biotinylated substances, such as biotin-tagged proteins.                                                                                                                                                                                                                                                                                                                                                                                   |
| 17-5143-02           | HiTrap Benzamidine FF (high sub)      | 2 × 1 ml              | > 35 mg trypsin                                                                                                                                                                                                | 90                           | 4 ml/min                     | 0.5 MPa, 5 bar             | 2–8           | 1–9        | Trypsin and trypsin-like serine proteases (e.g., thrombin and factor Xa).                                                                                                                                                                                                                                                                                                                                                                  |
| 17-5143-01           |                                       | 5 × 1 ml              |                                                                                                                                                                                                                |                              |                              |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-5144-01           |                                       | 1 × 5 ml <sup>2</sup> |                                                                                                                                                                                                                |                              | 20 ml/min                    |                            |               |            |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Code No.             | Chromatography medium                 | Pack size             |                                                                                                                                                                                                                |                              |                              |                            | Long term     | Short term |                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 17-0700-01           | 2'5' ADP Sepharose 4B                 | 5 g                   | 0.4 mg glucose-6-phosphate dehydrogenase                                                                                                                                                                       | 90                           | 75 cm/h                      | 0.02 MPa, 0.2 bar          | 4–10          | 4–10       | NADP <sup>+</sup> -dependent dehydrogenases and other enzymes which have affinity for NADP <sup>+</sup> (e.g., glucose-6-phosphate dehydrogenase).                                                                                                                                                                                                                                                                                         |
| 17-5123-10           | Benzamidine Sepharose 4 FF (high sub) | 25 ml                 | > 35 mg trypsin                                                                                                                                                                                                | 90                           | 400 cm/h                     | 0.1 MPa, 1 bar             | 2–8           | 1–9        | Trypsin and trypsin-like serine proteases (e.g., thrombin and factor Xa).                                                                                                                                                                                                                                                                                                                                                                  |
| 17-0948-01           | Blue Sepharose 6 FF <sup>7</sup>      | 50 ml <sup>®</sup>    | > 18 mg human albumin                                                                                                                                                                                          | 90                           | 400 cm/h                     | 0.1 MPa, 1 bar             | 4–12          | 3–13       | Albumin, broad range of nucleotide-requiring enzymes, coagulation factors. Ideal for scale up applications.                                                                                                                                                                                                                                                                                                                                |
| 17-5448-01           | Capto Blue <sup>7</sup>               | 25 ml                 | Approx. 25 mg human serum albumin                                                                                                                                                                              | 75                           | 600 cm/h                     | 0.3 MPa, 3 bar             | 2-13          | 2-13       | Capto Blue is highly chemically stable and has a more rigid agarose base matrix than Blue Sepharose 6 Fast Flow. This allows the use of faster flow rates and larger sample volumes, leading to higher throughput and improved process economy. The application area is the same as for Blue Sepharose Fast Flow (e.g., purification of albumin, enzymes including NAD+ and NADP+, coagulation factors, interferons, and related proteins) |
| 17-0529-01           | Calmodulin Sepharose 4B               | 10 ml                 | Ligand concentration 1 mg/ml                                                                                                                                                                                   | 90                           | 75 cm/h                      | 0.02 MPa, 0.2 bar          | 4–9           | 4–9        | ATPases, protein kinases, phosphodiesterases, neurotransmitters, interferon, calmodulin-binding peptide (CBP) tagged protein.                                                                                                                                                                                                                                                                                                              |
| 17-0575-01           | Chelating Sepharose FF <sup>7</sup>   | 50 ml <sup>®</sup>    | 24–30 µmol Zn <sup>2+</sup>                                                                                                                                                                                    | 90                           | 600 cm/h                     | 0.1 MPa, 1 bar             | 3–13          | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions.                                                                                                                                                                                                                                              |

Prepacked columns and media for group-specific purification (continued)

| Ordering information                   | Product                             |                              | Binding capacity per ml chromatography medium (approx.)            | Average particle diameter µm | Maximum operating flow rate <sup>1</sup> | Maximum operating pressure | pH stability <sup>2</sup> |            | Application areas: purification, isolation or removal of the following substances                                                                                                                                                                                                    |
|----------------------------------------|-------------------------------------|------------------------------|--------------------------------------------------------------------|------------------------------|------------------------------------------|----------------------------|---------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code No.                               | Chromatography columns              | Column size                  |                                                                    |                              |                                          |                            | Long term                 | Short term |                                                                                                                                                                                                                                                                                      |
| 17-0440-03<br>17-0440-01               | Con A<br>Sepharose 4B               | 5 ml<br>100 ml <sup>6</sup>  | 20–45 mg thyroglobulin                                             | 90                           | 75 cm/h<br>75 cm/h                       | 0.02 MPa, 0.2 bar          | 4–9                       | 4–9        | Molecules containing branched mannoses, carbohydrates with terminal mannose or glucose, (Man> Glc>GlcNAc) and sterically related residues like glycoproteins, membrane proteins, glycolipids, lipoproteins, polysaccharides, hormones, α <sub>1</sub> -antitrypsin, interferon.      |
| 17-0956-01                             | Gelatin<br>Sepharose 4B             | 25 ml                        | 61 mg plasma fibronectin                                           | 90                           | 75 cm/h                                  | 0.02 MPa, 0.2 bar          | 3–10                      | 3–10       | Fibronectin.                                                                                                                                                                                                                                                                         |
| 17-5279-01<br>17-5279-02               | Glutathione<br>Sepharose HP         | 25 ml<br>100 ml              | > 7 mg                                                             | 34                           | 150 cm/h<br>150 cm/h                     | 0.3 MPa, 3 bar             | 3–12                      | 3–12       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                                                                                                           |
| 17-5132-01<br>17-5132-02<br>17-5132-03 | Glutathione<br>Sepharose 4 FF       | 25 ml<br>100 ml<br>500 ml    | > 10 mg                                                            | 90                           | 450 cm/h<br>450 cm/h<br>450 cm/h         | 0.1 MPa, 1 bar             | 3–12                      | 3–12       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                                                                                                           |
| 17-0756-01<br>17-0756-05<br>17-0756-04 | Glutathione<br>Sepharose 4B         | 10 ml<br>100 ml<br>300 ml    | > 25 mg                                                            | 90                           | 75 cm/h<br>75 cm/h<br>75 cm/h            | 0.02 MPa, 0.2 bar          | 4-13                      | 4-13       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                                                                                                           |
| 17-0998-01                             | Heparin Sepharose 6 FF <sup>7</sup> | 50 ml <sup>6</sup>           | 2 mg bovine antithrombin III                                       | 90                           | 400 cm/h                                 | 0.1 MPa, 1 bar             | 4–12                      | 4–13       | Antithrombin III and other coagulation factors, lipoproteins, lipases, protein synthesis factors, DNA binding proteins.                                                                                                                                                              |
| 17-0969-01                             | IgG Sepharose 6 FF                  | 10 ml <sup>6</sup>           | 2 mg protein A                                                     | 90                           | 400 cm/h                                 | 0.1 MPa, 1 bar             | 3–10                      | 3–10       | Recombinant tagged proteins containing a protein A tag.                                                                                                                                                                                                                              |
| 17-0920-06<br>17-0920-07               | IMAC<br>Sepharose HP                | 25 ml<br>100 ml              | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 34                           | 300 cm/h<br>300 cm/h                     | 0.3 MPa, 3 bar             | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions.                                                                                        |
| 17-0921-07<br>17-0921-08               | IMAC<br>Sepharose 6 FF <sup>7</sup> | 25 ml<br>100 ml <sup>6</sup> | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 90                           | 600 cm/h<br>600 cm/h                     | 0.1 MPa, 1 bar             | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions.                                                                                        |
| 17-0444-01                             | Lentil Lectin<br>Sepharose 4B       | 25 ml                        | 16–35 mg thyroglobulin                                             | 90                           | 75 cm/h                                  | 0.02 MPa, 0.2 bar          | 3–10                      | 3–10       | Molecules containing branched mannoses with fucose linked (1,6) to the N-acetyl-glucosamine, (Man> Glc>GlcNAc) and sterically related residues like glycoproteins, membrane proteins, glycolipids, lipoproteins, polysaccharides, hormones, α <sub>1</sub> -antitrypsin, interferon. |
| 17-0690-01                             | Lysine<br>Sepharose 4B              | 15 g <sup>5</sup>            | 0.6–0.7 mg rRNA                                                    | 90                           | 75 cm/h                                  | 0.02 MPa, 0.2 bar          | 2–11                      | 2–11       | rRNA, plasminogen and plasminogen activator.                                                                                                                                                                                                                                         |
| 17-5113-01                             | Streptavidin<br>Sepharose HP        | 5 ml                         | Biotin > 300 nmol, 6 mg biotinylated BSA                           | 34                           | 150 cm/h                                 | 0.3 MPa, 3 bar             | 4–9                       | 2–10.5     | Biotinylated substances, such as biotin-tagged proteins and biotin-tagged DNA.                                                                                                                                                                                                       |

Prepacked columns and media for isolation and purification of immunoglobulins

| Ordering information                                               | Product                    |                                                             | Binding capacity per ml chromatography medium (approx.) | Average particle diameter µm | Maximum operating flow rate <sup>1</sup>                   | Maximum operating pressure | pH stability <sup>2</sup> |            | Application areas                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------------------------------------------|----------------------------|-------------------------------------------------------------|---------------------------------------------------------|------------------------------|------------------------------------------------------------|----------------------------|---------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code No.                                                           | Prepacked columns          | Column size                                                 |                                                         |                              |                                                            |                            | Long term                 | Short term |                                                                                                                                                                                                                                                                                                                                                        |
| 29-0485-76<br>17-0402-01<br>17-0402-03<br>17-0403-01<br>17-0403-03 | HiTrap Protein A HP        | 1 × 1 ml<br>5 × 1 ml<br>2 × 1 ml<br>1 × 5 ml<br>5 × 5 ml    | 20 mg human IgG                                         | 34                           | 4 ml/min<br>4 ml/min<br>4 ml/min<br>20 ml/min<br>20 ml/min | 0.5 MPa, 5 bar             | 3–9                       | 2*–10      | Isolation and purification of classes, subclasses and fragments of IgG from many different. species.                                                                                                                                                                                                                                                   |
| 29-0485-81<br>17-0404-01<br>17-0404-03<br>17-0405-01<br>17-0405-03 | HiTrap Protein G HP        | 1 × 1 ml<br>5 × 1 ml<br>2 × 1 ml<br>1 × 5 ml<br>5 × 5 ml    | 25 mg human IgG                                         | 34                           | 4 ml/min<br>4 ml/min<br>4 ml/min<br>20 ml/min<br>20 ml/min | 0.5 MPa, 5 bar             | 3–9                       | 2*–10      | Protein G and protein A have different IgG binding specificities, dependent on the origin of the IgG. Binds to all IgG subclasses from human, mouse, and rat; binds total IgG from guinea pig, goat, cow, sheep, and horse. Unlike protein A, protein G binds human IgG3. Applications of protein G include practically all applications of protein A. |
| 29-0486-65<br>17-5478-51<br>17-5478-15<br>17-5478-55               | HiTrap Protein L           | 1 × 1 ml<br>5 × 1 ml<br>1 × 5 ml<br>5 × 5 ml                | Approx. 25 mg human Fab                                 | 85                           | 4 ml/min<br>4 ml/min<br>20 ml/min<br>20 ml/min             | 0.5 MPa, 5 bar             | 2-10                      | 15 mM NaOH | Purification of antibodies and antibody fragments such as Fab fragments, scFv, and Dabs containing kappa light chains.                                                                                                                                                                                                                                 |
| 17-5478-14                                                         | HiScreen Capto L           | 1 × 4.7 ml                                                  | Approx. 25 mg human Fab                                 | 85                           | 3.9 ml/min                                                 | 0.3 MPa, 3 bar             | 2-10                      | 15 mM NaOH | Optimization of chromatography conditions in process development                                                                                                                                                                                                                                                                                       |
| 17-5079-01<br>17-5079-02<br>28-9464-89<br>17-5080-01<br>17-5080-02 | HiTrap rProtein A FF       | 5 × 1 ml<br>2 × 1 ml<br>100 × 1 ml*<br>1 × 5 ml<br>5 × 5 ml | 50 mg human IgG                                         | 90                           | 4 ml/min<br>4 ml/min<br>4 ml/min<br>20 ml/min<br>20 ml/min | 0.5 MPa, 5 bar             | 3–10                      | 2*–11      | Recombinant protein A exhibits similar Fc region specificity to that of native protein A but shows enhanced binding capacity.                                                                                                                                                                                                                          |
| 28-4082-53<br>28-4082-55<br>28-4082-56                             | HiTrap MabSelect™          | 5 × 1 ml<br>1 × 5 ml<br>5 × 5 ml                            | min 30 mg human IgG                                     | 85                           | 4 ml/min<br>20 ml/min<br>20 ml/min                         | 0.5 MPa, 5 bar             | 3–10                      | 2*–12      | For high-throughput capture of monoclonal antibodies.                                                                                                                                                                                                                                                                                                  |
| 29-0491-04<br>11-0034-93<br>11-0034-94<br>11-0034-95               | HiTrap MabSelect SuRe™     | 1 × 1 ml<br>1 × 5 ml<br>5 × 1 ml<br>5 × 5 ml                | min 30 mg human IgG                                     | 85                           | 4 ml/min<br>4 ml/min<br>20 ml/min<br>20 ml/min             | 0.5 MPa, 5 bar             | 3–12                      | 2*–14      | Designed to tolerate harsh cleaning-in-place protocols.                                                                                                                                                                                                                                                                                                |
| 28-4082-58<br>28-4082-60<br>28-4082-61                             | HiTrap MabSelect Xtra™     | 1 × 5 ml<br>5 × 1 ml<br>5 × 5 ml                            | Approx. 40 mg human IgG                                 | 75                           | 4 ml/min<br>20 ml/min<br>20 ml/min                         | 0.5 MPa, 5 bar             | 3–10                      | 2–12       | For capture of high-titer monoclonal antibody feedstreams.                                                                                                                                                                                                                                                                                             |
| 17-5110-01                                                         | HiTrap IgM Purification HP | 5 × 1 ml                                                    | 5 mg human IgM                                          | 34                           | 4 ml/min                                                   | 0.5 MPa, 5 bar             | 3–11                      | 2*–13      | Purification of monoclonal IgM from hybridoma cell culture and human IgM.                                                                                                                                                                                                                                                                              |
| 17-5115-01                                                         | HiTrap IgY Purification HP | 1 × 5 ml                                                    | 20 mg pure IgY/ml medium or 1/4 egg yolk/5 ml medium    | 34                           | 20 ml/min                                                  | 0.5 MPa, 5 bar             | 3–11                      | 2*–13      | Purification of IgY from egg yolk.                                                                                                                                                                                                                                                                                                                     |
| 28-9269-73                                                         | HiScreen MabSelect         | 1 × 4.7 ml                                                  | min 30 mg human IgG                                     | 85                           | 3.9 ml/min                                                 | 0.3 MPa, 3 bar             | 3-10                      | 2*-12      | Optimization of chromatography conditions in process development                                                                                                                                                                                                                                                                                       |
| 28-9269-76                                                         | HiScreen MabSelect Xtra    | 1 × 4.7 ml                                                  | Approx. 40 mg human IgG                                 | 75                           | 2.3 ml/min                                                 | 0.3 MPa, 3 bar             | 3-10                      | 2*-12      | Optimization of chromatography conditions in process development                                                                                                                                                                                                                                                                                       |
| 28-9269-77                                                         | HiScreen MabSelect SuRe    | 1 × 4.7 ml                                                  | min 30 mg human IgG                                     | 85                           | 3.9 ml/min                                                 | 0.3 MPa, 3 bar             | 3-12                      | 2*-14      | Optimization of chromatography conditions in process development                                                                                                                                                                                                                                                                                       |
| 17-5474-15                                                         | HiScreen MabSelect SuRe LX | 1 × 4.7 ml                                                  | Approx. 60 mg human IgG                                 | 85                           | 3.9 ml/min                                                 | 0.3 MPa, 3 bar             | 3-12                      | 2*-14      | Optimized for high binding capacity at long residence time.                                                                                                                                                                                                                                                                                            |

Prepacked columns and media for isolation and purification of immunoglobulins  
 (continued)

| Ordering information                  | Product                                |                             | Binding capacity per ml chromatography medium (approx.)                                             | Average particle diameter µm | Maximum operating flow rate <sup>1</sup> | Maximum operating pressure | pH stability <sup>2</sup> |            | Application areas                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------|----------------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------|----------------------------|---------------------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code No.                              | Kit (including buffers)                | Included column             |                                                                                                     |                              |                                          |                            |                           |            |                                                                                                                                                                                                                                                                                                                                                        |
| 17-1128-01                            | MABTrap™ Kit                           | HiTrap Protein G HP, 1 ml   | 25 mg human IgG                                                                                     | 34                           | 4 ml/min                                 | 0.5 MPa, 5 bar             | 3–9                       | 2*–9       | MABTrap Kit includes all necessary buffers for ten purifications using a syringe.                                                                                                                                                                                                                                                                      |
| Code No.                              | Chromatography medium                  | Pack size                   |                                                                                                     |                              |                                          |                            |                           |            |                                                                                                                                                                                                                                                                                                                                                        |
| 17-0780-01<br>17-0963-03              | Protein A Sepharose CL-4B              | 1.5 g<br>25 ml <sup>6</sup> | 16–25 mg human IgG,<br>2 mg mouse IgG                                                               | 90                           | 150 cm/h<br>150 cm/h                     | 0.02 MPa, 0.2 bar          | 3–9                       | 2*–10      | Isolation and purification of classes, subclasses and fragments of IgG from many different species.                                                                                                                                                                                                                                                    |
| 17-5280-01<br>17-5280-04              | nProtein A Sepharose 4 FF <sup>7</sup> | 5 ml<br>25 ml <sup>6</sup>  | 35 mg human IgG,<br>3–10 mg mouse IgG                                                               | 90                           | 400 cm/h<br>400 cm/h                     | 0.1 MPa, 1 bar             | 3–9                       | 2*–10      | nProtein A Sepharose 4 FF is ideal for recovery and purification of antibodies from cell culture at both laboratory and process scale. nProtein A Sepharose 4 FF is manufactured without using any animal-derived components.                                                                                                                          |
| 17-1279-01<br>17-1279-02              | rProtein A Sepharose FF <sup>7</sup>   | 5 ml<br>25 ml <sup>6</sup>  | 50 mg human IgG,<br>8–20 mg mouse IgG                                                               | 90                           | 400 cm/h<br>400 cm/h                     | 0.1 MPa, 1 bar             | 3–10                      | 2*–11      | Recombinant protein A exhibits similar Fc region specificity to that of native protein A but shows enhanced binding capacity.                                                                                                                                                                                                                          |
| 17-0618-01<br>17-0618-02              | Protein G Sepharose 4 FF <sup>7</sup>  | 5 ml<br>25 ml <sup>6</sup>  | 24 mg human IgG, 23 mg cow IgG, 19 mg goat IgG, 17 mg guinea pig IgG, 10 mg mouse IgG, 7 mg rat IgG | 90                           | 400 cm/h<br>400 cm/h                     | 0.1 MPa, 1 bar             | 3–9                       | 2*–10      | Protein G and protein A have different IgG binding specificities, dependent on the origin of the IgG. Binds to all IgG subclasses from human, mouse, and rat; binds total IgG from guinea pig, goat, cow, sheep, and horse. Unlike protein A, protein G binds human IgG3. Applications of protein G include practically all applications of protein A. |
| 17-0885-01<br>17-0885-02              | GammaBind™ G Sepharose                 | 5 ml<br>25 ml <sup>6</sup>  | > 17 mg human IgG                                                                                   | 90                           | 75 cm/h<br>75 cm/h                       | 0.015 MPa, 0.15 bar        | 3–9                       | 2*–9       | Binds to all IgG subclasses from human, mouse, and rat; binds total IgG from guinea pig, goat, cow, sheep, and horse.                                                                                                                                                                                                                                  |
| 17-0886-01<br>17-0886-02              | GammaBind Plus Sepharose               | 5 ml<br>25 ml <sup>6</sup>  | > 20 mg human IgG                                                                                   | 90                           | 150 cm/h<br>150 cm/h                     | 0.015 MPa, 0.15 bar        | 3–9                       | 2*–9       | Enhanced binding capabilities for mouse and rat monoclonals (also human, cow, sheep, horse, rabbit, and goat).                                                                                                                                                                                                                                         |
| 17-6002-35                            | Immunoprecipitation Starter Pack       | 2 × 2 ml                    | See nProtein A Sepharose 4 FF                                                                       | 90                           | 400 cm/h                                 | 0.1 MPa, 1 bar             | 3–9                       | 2*–10      | Immunoprecipitation Starter Pack includes 2 ml nProtein A Sepharose 4 FF and 2 ml of Protein G Sepharose 4 FF.                                                                                                                                                                                                                                         |
|                                       |                                        |                             | See Protein G Sepharose 4 FF                                                                        | 90                           | 400 cm/h                                 |                            | 2*–9                      | 2*–10      |                                                                                                                                                                                                                                                                                                                                                        |
| 17-5478-06 <sup>7</sup><br>17-5478-01 | Capto L                                | 5 ml<br>25 ml <sup>6</sup>  | Approx. 25 mg human Fab                                                                             | 85                           | 500 cm/h<br>500 cm/h                     | 0.1 MPa, 1 bar             | 2-10                      | 15 mM NaOH | Purification of antibodies and antibody fragments such as Fab fragments, scFv, and Dabs containing kappa light chains.                                                                                                                                                                                                                                 |
| 17-5199-01                            | MabSelect <sup>7</sup>                 | 25 ml <sup>6</sup>          | min 30 mg human IgG                                                                                 | 85                           | 500 cm/h**                               | 0.2 MPa, 2 bar             | 3–10                      | 2*–12      | For high-throughput capture of monoclonal antibodies.                                                                                                                                                                                                                                                                                                  |
| 17-5269-07                            | MabSelect Xtra <sup>7</sup>            | 25 ml <sup>6</sup>          | Approx. 41 mg human IgG                                                                             | 75                           | 300 cm/h**                               | 0.15 MPa, 1.5 bar          | 3–10                      | 2*–12      | For capture of high-titer feedstreams.                                                                                                                                                                                                                                                                                                                 |
| 17-5438-01                            | MabSelect SuRe <sup>7</sup>            | 25 ml <sup>6</sup>          | min 30 mg human IgG                                                                                 | 85                           | 500 cm/h**                               | 0.2 MPa, 2 bar             | 3–12                      | 2*-14      | Designed to tolerate harsh cleaning-in-place protocols.                                                                                                                                                                                                                                                                                                |
| 17-5474-01                            | MabSelect SuRe LX <sup>7</sup>         | 25 ml <sup>6</sup>          | Approx. 60 mg human IgG                                                                             | 85                           | 500 cm/h**                               | 0.2 MPa, 2 bar             | 3–12                      | 2*-14      | Optimized for high binding capacity at long residence time.                                                                                                                                                                                                                                                                                            |

\* pH below 3 is sometimes required to elute strongly bound immunoglobulins. However, protein ligands may hydrolyse at very low pH.

\*\* at large scale, see Data Files 18-1149-94, 11-0011-65, 11-0011-57, and 28-9870-62.

Prepacked columns and media for recombinant tagged proteins

| Ordering information                                                             | Product           |                                                                                                    | Binding capacity per ml chromatography medium (approx.) | Average particle diameter µm | Maximum operating flow rate <sup>1</sup>                                | Maximum operating pressure | pH stability <sup>2</sup> |            | Application areas                                                                                                                                                                               |
|----------------------------------------------------------------------------------|-------------------|----------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------|-------------------------------------------------------------------------|----------------------------|---------------------------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code No.                                                                         | Prepacked columns | Column size                                                                                        |                                                         |                              |                                                                         |                            | Long term                 | Short term |                                                                                                                                                                                                 |
| 29-0510-21<br>17-5247-01<br>17-5247-05<br>17-5248-01<br>17-5284-02<br>17-5248-05 | HisTrap™ HP       | 1 × 1 ml<br>5 × 1 ml<br>100 × 1 ml <sup>8</sup><br>1 × 5 ml<br>5 × 5 ml<br>100 × 5 ml <sup>8</sup> | At least 40 mg (Histidine) <sub>6</sub> -tagged protein | 34                           | 4 ml/min<br>4 ml/min<br>4 ml/min<br>20 ml/min<br>20 ml/min<br>20 ml/min | 0.5 MPa, 5 bar             | 3–12                      | 2–14       | Histidine-tagged proteins. HisTrap HP columns are prepacked with Ni Sepharose High Performance.                                                                                                 |
| 17-5319-01<br>17-5319-02<br>17-5255-01<br>17-5255-02                             |                   | 5 × 1 ml<br>100 × 1 ml <sup>8</sup><br>5 × 5 ml<br>100 × 5 ml <sup>8</sup>                         |                                                         |                              |                                                                         |                            |                           |            |                                                                                                                                                                                                 |
| 17-5319-01<br>17-5319-02<br>17-5255-01<br>17-5255-02                             |                   | 5 × 1 ml<br>100 × 1 ml <sup>8</sup><br>5 × 5 ml<br>100 × 5 ml <sup>8</sup>                         |                                                         |                              |                                                                         |                            |                           |            |                                                                                                                                                                                                 |
| 29-0486-31<br>11-0004-58<br>11-0004-59<br>17-5286-01<br>17-5286-02               |                   | 1 × 1 ml<br>5 × 1 ml<br>100 × 1 ml <sup>8</sup><br>5 × 5 ml<br>100 × 5 ml <sup>8</sup>             |                                                         |                              |                                                                         |                            |                           |            |                                                                                                                                                                                                 |
| 17-5256-01                                                                       | HisPrep™ FF 16/10 | 1 × 20 ml                                                                                          | See HisTrap FF                                          | 90                           | 10 ml/min                                                               | 0.15 MPa, 1.5 bar          | 3–12                      | 2–14       | Histidine-tagged proteins. HisPrep FF columns are prepacked with Ni Sepharose 6 Fast Flow (ideal for scale-up).                                                                                 |
| 28-9782-44                                                                       | HiScreen Ni FF    | 1 × 4.7 ml                                                                                         | See HisTrap FF                                          | 90                           | 3.5 ml/min                                                              | 0.3 MPa, 3 bar             | 3-12                      | 2-14       | Histidine-tagged proteins. Excellent for method optimization and parameter screening                                                                                                            |
| 29-0485-86<br>17-3712-05<br>17-3712-06                                           | HisTrap excel     | 1 × 1 ml<br>5 × 1 ml<br>5 × 5 ml                                                                   | At least 10 mg (Histidine) <sub>6</sub> -tagged protein | 90                           | 4 ml/min<br>4 ml/min<br>20 ml/min                                       | 0.5 MPa, 5 bar             | 2-12                      | 2-14       | Capture and purification of histidine-tagged proteins secreted into eukaryotic cell culture supernatants                                                                                        |
| 29-0485-65<br>28-9537-66<br>28-9538-05<br>28-9537-67<br>28-9538-09               |                   | 1 × 1 ml<br>5 × 1 ml<br>100 × 1 ml*<br>5 × 5 ml<br>100 × 5 ml*                                     |                                                         |                              |                                                                         |                            |                           |            |                                                                                                                                                                                                 |
| 29-0486-53<br>28-9075-46<br>28-9075-47<br>28-9075-48                             | StrepTrap™ HP     | 1 × 1 ml<br>5 × 1 ml<br>1 × 5 ml<br>5 × 5 ml                                                       | Approx. 6 mg <i>Strep</i> -tag II protein               | 34                           | 4 ml/min<br>4 ml/min<br>20 ml/min<br>20 ml/min                          | 0.5 MPa, 5 bar             | > 7                       | > 7        | <i>Strep</i> -tag II fusion proteins. StrepTrap HP columns are prepacked with StrepTactin Sepharose High Performance.                                                                           |
| 29-0486-41<br>28-9187-78<br>28-9187-79<br>28-9187-80                             |                   | 1 × 1 ml<br>5 × 1 ml<br>1 × 5 ml<br>5 × 5 ml                                                       |                                                         |                              |                                                                         |                            |                           |            |                                                                                                                                                                                                 |
| 17-5281-01<br>17-5281-05<br>17-5282-01<br>17-5282-02<br>17-5282-05               | GSTrap HP         | 5 × 1 ml<br>100 × 1 ml <sup>8</sup><br>1 × 5 ml<br>5 × 5 ml<br>100 × 5 ml <sup>8</sup>             | Approx. 10 mg GST-tagged protein                        | 34                           | 4 ml/min<br>4 ml/min<br>20 ml/min<br>20 ml/min<br>20 ml/min             | 0.5 MPa, 5 bar             | 3–12                      | 3–12       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                      |
| 29-0486-09<br>28-4017-45<br>28-4017-46<br>28-4017-47<br>28-4017-48<br>28-4017-49 |                   | 1 × 1 ml<br>5 × 1 ml<br>100 × 1 ml <sup>8</sup><br>1 × 5 ml<br>5 × 5 ml<br>100 × 5 ml <sup>8</sup> |                                                         |                              |                                                                         |                            |                           |            |                                                                                                                                                                                                 |
| 17-5130-02<br>17-5130-01<br>17-5130-05<br>17-5131-01<br>17-5131-02               | GSTrap FF         | 2 × 1 ml<br>5 × 1 ml<br>100 × 1 ml <sup>9</sup><br>1 × 5 ml<br>5 × 5 ml                            | 10 mg recombinant GST                                   | 90                           | 4 ml/min<br>4 ml/min<br>4 ml/min<br>20 ml/min<br>20 ml/min              | 0.5 MPa, 5 bar             | 3–12                      | 3–12       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression GST-tagged protein " vectors, other glutathione S-transferases and glutathione-dependent proteins. |

Prepacked columns and media for recombinant tagged proteins (continued)

| Ordering information | Product                        |                              | Binding capacity per ml chromatography medium (approx.)                                                                                                                                                        | Average particle diameter µm | Maximum operating flow rate <sup>1</sup> | Maximum operating pressure | pH stability <sup>2</sup> |            | Application areas                                                                                                                                                                             |
|----------------------|--------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------------------|----------------------------|---------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code No.             | Prepacked columns              | Column size                  |                                                                                                                                                                                                                |                              |                                          |                            | Long term                 | Short term |                                                                                                                                                                                               |
| 17-5234-01           | GSTPrep FF 16/10               | 1 × 20 ml                    | See GSTrap FF                                                                                                                                                                                                  | 90                           | 10 ml/min                                | 0.15 MPa, 1.5 bar          | 3–12                      | 3–12       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                    |
| 17-0408-01           | HiTrap Chelating HP            | 5 × 1 ml                     | 12 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> )<br>20 ml/min                                                                                                                                | 34                           | 4 ml/min                                 | 0.5 MPa, 5 bar             | 3–13                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions. |
| 17-0409-01           |                                | 1 × 5 ml                     |                                                                                                                                                                                                                |                              | 4 ml/min                                 |                            |                           |            |                                                                                                                                                                                               |
| 17-0409-03           |                                | 5 × 5 ml                     |                                                                                                                                                                                                                |                              | 4 ml/min                                 |                            |                           |            |                                                                                                                                                                                               |
| 17-0409-05           |                                | 100 × 5 ml <sup>8</sup>      |                                                                                                                                                                                                                |                              | 4 ml/min                                 |                            |                           |            |                                                                                                                                                                                               |
| 17-0920-03           | HiTrap IMAC HP                 | 5 × 1 ml                     | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> )                                                                                                                                             | 34                           | 4 ml/min                                 | 0.5 MPa, 5 bar             | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions. |
| 17-0920-05           |                                | 5 × 5 ml                     |                                                                                                                                                                                                                |                              | 20 ml/min                                |                            |                           |            |                                                                                                                                                                                               |
| 17-0921-02           | HiTrap IMAC FF                 | 5 × 1 ml                     | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> )<br>25 mg (Histidine) <sub>6</sub> -tagged protein (Cu <sup>2+</sup> )                                                                       | 90                           | 4 ml/min                                 | 0.5 MPa, 5 bar             | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions. |
| 17-0921-04           |                                | 5 × 5 ml                     | 15 mg (Histidine) <sub>6</sub> -tagged protein (Zn <sup>2+</sup> )                                                                                                                                             |                              | 20 ml/min                                |                            |                           |            |                                                                                                                                                                                               |
| 17-0921-06           | HiPrep IMAC FF 16/10           | 1 × 20 ml                    | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> )<br>25 mg (Histidine) <sub>6</sub> -tagged protein (Cu <sup>2+</sup> )<br>15 mg (Histidine) <sub>6</sub> -tagged protein (Zn <sup>2+</sup> ) | 90                           | 10 ml/min                                | 0.15 MPa, 1.5 bar          | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions. |
| 17-5112-01           |                                |                              |                                                                                                                                                                                                                |                              |                                          |                            |                           |            |                                                                                                                                                                                               |
| 17-5112-01           | HiTrap Streptavidin HP         | 5 × 1 ml                     | Biotin > 300 nmol, 6 mg biotinylated BSA                                                                                                                                                                       | 34                           | 4 ml/min                                 | 0.5 MPa, 5 bar             | 4–9                       | 2–10.5     | Biotinylated substances, such as biotin-tagged proteins.                                                                                                                                      |
| Code No.             | Kit (including buffers)        | Included column              |                                                                                                                                                                                                                |                              |                                          |                            |                           |            |                                                                                                                                                                                               |
| 28-4014-77           | HisTrap FF crude Kit           | HisTrap FF crude<br>3 × 1 ml | Approx. 40 mg (Histidine) <sub>6</sub> -tagged protein                                                                                                                                                         | 34                           | 4 ml/min                                 | 0.5 MPa, 5 bar             | 3–12                      | 2–14       | See HisTrap FF crude. Includes all necessary buffers for 10–12 purifications using a syringe.                                                                                                 |
| Code No.             | Chromatography medium          | Pack size                    |                                                                                                                                                                                                                |                              |                                          |                            |                           |            |                                                                                                                                                                                               |
| 17-5268-01           | Ni Sepharose HP                | 25 ml                        | At least 40 mg (Histidine) <sub>6</sub> -tagged protein                                                                                                                                                        | 34                           | 150 cm/h                                 | 0.3 MPa, 3 bar             | 3–12                      | 2–14       | Histidine-tagged proteins.                                                                                                                                                                    |
| 17-5268-02           |                                | 100 ml                       |                                                                                                                                                                                                                |                              | 150 cm/h                                 |                            |                           |            |                                                                                                                                                                                               |
| 17-5318-06           | Ni Sepharose 6 FF <sup>7</sup> | 5 ml                         | Approx. 40 mg (Histidine) <sub>6</sub> -tagged protein                                                                                                                                                         | 90                           | 600 cm/h                                 | 0.1 MPa, 1 bar             | 3–12                      | 2–14       | Histidine-tagged proteins. Ni Sepharose 6 FF is ideal for scale-up, batch and gravity-flow column usage as well as screening of expression levels using multiwell plate format.               |
| 17-5318-01           |                                | 25 ml                        |                                                                                                                                                                                                                |                              | 600 cm/h                                 |                            |                           |            |                                                                                                                                                                                               |
| 17-5318-02           |                                | 100 ml                       |                                                                                                                                                                                                                |                              | 600 cm/h                                 |                            |                           |            |                                                                                                                                                                                               |
| 17-5318-03           |                                | 500 ml <sup>6</sup>          |                                                                                                                                                                                                                |                              | 600 cm/h                                 |                            |                           |            |                                                                                                                                                                                               |
| 17-3712-02           | Ni Sepharose excel             | 100 ml                       | At least 10 mg (Histidine) <sub>6</sub> -tagged protein                                                                                                                                                        | 90                           | 600 cm/h                                 | 0.1 MPa, 1 bar             | 2-12                      | 2-14       | Capture and purification of histidine-tagged proteins secreted into eukaryotic cell culture supernatants                                                                                      |
| 17-3712-03           |                                | 500 ml                       |                                                                                                                                                                                                                |                              | 600 cm/h                                 |                            |                           |            |                                                                                                                                                                                               |
| 28-9574-99           | TALON Superflow                | 10 ml                        | up to 20 mg (Histidine) <sub>6</sub> -tagged protein                                                                                                                                                           | 60-160                       | 2000 cm/h                                |                            | 3-12                      | 2-14       | Histidine-tagged proteins. TALON Superflow which is a cobalt-based IMAC medium offering a different selectivity compared to nickel-charged media                                              |
| 28-9575-02           |                                | 50 ml                        |                                                                                                                                                                                                                |                              | 2000 cm/h                                |                            |                           |            |                                                                                                                                                                                               |
| 17-5279-01           | Glutathione Sepharose HP       | 25 ml                        | > 7 mg                                                                                                                                                                                                         | 34                           | 150 cm/h                                 | 0.3 MPa, 3 bar             | 3–12                      | 3–12       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                    |
| 17-5279-02           |                                | 100 ml                       |                                                                                                                                                                                                                |                              | 150 cm/h                                 |                            |                           |            |                                                                                                                                                                                               |
| 17-5132-01           | Glutathione Sepharose 4 FF     | 25 ml                        | > 10 mg                                                                                                                                                                                                        | 90                           | 450 cm/h                                 | 0.1 MPa, 1 bar             | 3–12                      | 3–12       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                    |
| 17-5132-02           |                                | 100 ml                       |                                                                                                                                                                                                                |                              | 450 cm/h                                 |                            |                           |            |                                                                                                                                                                                               |
| 17-5132-03           |                                | 500 ml                       |                                                                                                                                                                                                                |                              | 450 cm/h                                 |                            |                           |            |                                                                                                                                                                                               |

| Ordering information | Product                             |                     | Binding capacity per ml chromatography medium (approx.)            | Average particle diameter µm | Maximum operating flow rate <sup>1</sup> | Maximum operating pressure | pH stability <sup>2</sup> |            | Application areas                                                                                                                                                                                                          |
|----------------------|-------------------------------------|---------------------|--------------------------------------------------------------------|------------------------------|------------------------------------------|----------------------------|---------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code No.             | Chromatography columns              | Column size         |                                                                    |                              |                                          |                            | Long term                 | Short term |                                                                                                                                                                                                                            |
| 17-0756-01           | Glutathione Sepharose 4B            | 10 ml               | > 25 mg                                                            | 90                           | 75 cm/h                                  | 0.02 MPa, 0.2 bar          | 4–13                      | 4–13       | Glutathione S-transferase (GST) tagged proteins produced using the pGEX series of expression vectors, other glutathione S-transferases and glutathione-dependent proteins.                                                 |
| 17-0756-05           |                                     | 100 ml              |                                                                    |                              | 75 cm/h                                  |                            |                           |            |                                                                                                                                                                                                                            |
| 17-0756-04           |                                     | 300 ml              |                                                                    |                              | 75 cm/h                                  |                            |                           |            |                                                                                                                                                                                                                            |
| 17-0575-01           | Chelating Sepharose FF <sup>7</sup> | 50 ml <sup>6</sup>  | 24–30 µmol Zn <sup>2+</sup>                                        | 90                           | 600 cm/h                                 | 0.1 MPa, 1 bar             | 3–13                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface.                                                                                                                                  |
| 17-0920-06           | IMAC Sepharose HP                   | 25 ml               | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 34                           | 300 cm/h                                 | 0.3 MPa, 3 bar             | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions.                              |
| 17-0920-07           |                                     | 100 ml              |                                                                    |                              | 300 cm/h                                 |                            |                           |            |                                                                                                                                                                                                                            |
| 28-9355-99           | StrepTactin™                        | 10 ml               | Approx. 6 mg <i>Strep</i> -tag II protein                          | 34                           | 150 cm/h                                 | 0.3 MPa, 3 bar             | > 7                       | > 7        | <i>Strep</i> -tag II fusion proteins                                                                                                                                                                                       |
| 28-9356-00           | Sepharose HP                        | 50 ml               |                                                                    |                              | 150 cm/h                                 |                            |                           |            |                                                                                                                                                                                                                            |
| 28-9355-97           | Dextrin Sepharose HP                | 25 ml               | Approx. 10 mg MBP-tagged protein                                   | 34                           | 150 cm/h                                 | 0.3 MPa, 3 bar             | > 7                       | 2-13       | MBP-tagged proteins                                                                                                                                                                                                        |
| 28-9355-98           |                                     | 100 ml              |                                                                    |                              | 150 cm/h                                 |                            |                           |            |                                                                                                                                                                                                                            |
| 17-0921-07           | IMAC Sepharose 6 FF <sup>7</sup>    | 25 ml               | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 90                           | 600 cm/h                                 | 0.1 MPa, 1 bar             | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions.                              |
| 17-0921-08           |                                     | 100 ml <sup>6</sup> |                                                                    |                              | 600 cm/h                                 |                            |                           |            |                                                                                                                                                                                                                            |
| 17-0969-01           | IgG Sepharose 6 FF                  | 10 ml <sup>6</sup>  | 2 mg protein A                                                     | 90                           | 400 cm/h                                 | 0.1 MPa, 1 bar             | 3–10                      | 3–10       | Recombinant tagged proteins containing a protein A tag. Tandem affinity purification (TAP) in combination with Calmodulin Sepharose 4B of protein complexes                                                                |
| 17-5113-01           | Streptavidin Sepharose HP           | 5 ml                | Biotin > 300 nmol, 6 mg biotinylated BSA                           | 34                           | 150 cm/h                                 | 0.3 MPa, 3 bar             | 4–9                       | 2–10.5     | Biotinylated substances, such as biotin-tagged proteins.                                                                                                                                                                   |
| 17-0529-01           | Calmodulin Sepharose 4B             | 10 ml               | Ligand concentration 1 mg/ml                                       | 90                           | 75 cm/h                                  | 0.02 MPa, 0.2 bar          | 4–9                       | 4–9        | ATPases, protein kinases, phosphodiesterases, neurotransmitters, interferon, calmodulinbinding peptide (CBP) tagged protein. Tandem affinity purification (TAP) in combination with IgG Sepharose FF of protein complexes. |

Prepacked columns and media for metal chelate chromatography

| Ordering information | Product                             |                         | Binding capacity per ml chromatography medium (approx.)            | Average particle diameter µm | Maximum operating flow rate <sup>1</sup> | Maximum operating pressure | pH stability <sup>2</sup> |            | Application areas                                                                                                                                                                             |
|----------------------|-------------------------------------|-------------------------|--------------------------------------------------------------------|------------------------------|------------------------------------------|----------------------------|---------------------------|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Code No.             | Prepacked columns                   | Column size             |                                                                    |                              |                                          |                            | Long term                 | Short term |                                                                                                                                                                                               |
| 17-0408-01           | HiTrap Chelating HP                 | 5 × 1 ml                | 12 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 34                           | 4 ml/min                                 | 0.5MPa, 5 bar              | 3–13                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions. |
| 17-0409-01           |                                     | 1 × 5 ml                |                                                                    |                              | 20 ml/min                                |                            |                           |            |                                                                                                                                                                                               |
| 17-0409-03           |                                     | 5 × 5 ml                |                                                                    |                              | 20 ml/min                                |                            |                           |            |                                                                                                                                                                                               |
| 17-0409-05           |                                     | 100 × 5 ml <sup>8</sup> |                                                                    |                              | 20 ml/min                                |                            |                           |            |                                                                                                                                                                                               |
| 17-0920-03           | HiTrap IMAC HP                      | 5 × 1 ml <sup>4</sup>   | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 34                           | 4 ml/min                                 | 0.5MPa, 5 bar              | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions. |
| 17-0920-05           |                                     | 5 × 5 ml                |                                                                    |                              | 20 ml/min                                |                            |                           |            |                                                                                                                                                                                               |
| 17-0921-02           | HiTrap IMAC FF                      | 5 × 1 ml                | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 90                           | 4 ml/min                                 | 0.5MPa, 5 bar              | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions. |
| 17-0921-04           |                                     | 5 × 5 ml                | 25 mg (Histidine) <sub>6</sub> -tagged protein (Cu <sup>2+</sup> ) |                              | 20 ml/min                                |                            |                           |            |                                                                                                                                                                                               |
| 17-0921-06           | HiPrep IMAC FF 16/10                | 1 × 20 ml               | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 90                           | 10 ml/min                                | 0.15 MPa, 1.5 bar          | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions. |
|                      |                                     |                         | 25 mg (Histidine) <sub>6</sub> -tagged protein (Cu <sup>2+</sup> ) |                              |                                          |                            |                           |            |                                                                                                                                                                                               |
|                      |                                     |                         | 15 mg (Histidine) <sub>6</sub> -tagged protein (Zn <sup>2+</sup> ) |                              |                                          |                            |                           |            |                                                                                                                                                                                               |
| Code No.             | Chromatography medium               | Column size             |                                                                    |                              |                                          |                            |                           |            |                                                                                                                                                                                               |
| 17-0575-01           | Chelating Sepharose FF <sup>7</sup> | 50 ml <sup>6</sup>      | 24–30 µmol Zn <sup>6</sup>                                         | 90                           | 600 cm/h                                 | 0.1 MPa, 1 bar             | 3–13                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions. |
| 17-0920-06           | IMAC Sepharose HP                   | 25 ml                   | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 34                           | 300 cm/h                                 | 0.3 MPa, 3 bar             | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions. |
| 17-0920-07           |                                     | 100 ml                  |                                                                    |                              | 300 cm/h                                 |                            |                           |            |                                                                                                                                                                                               |
| 17-0921-07           | IMAC Sepharose 6 FF <sup>7</sup>    | 25 ml                   | 40 mg (Histidine) <sub>6</sub> -tagged protein (Ni <sup>2+</sup> ) | 90                           | 600 cm/h                                 | 0.1 MPa, 1 bar             | 3–12                      | 2–14       | Proteins with complex-forming amino acids (such as His, Cys, Trp) on the protein surface. Optimizes purification of histidine-tagged proteins by allowing charging with different metal ions. |
| 17-0921-08           |                                     | 100 ml <sup>6</sup>     |                                                                    |                              | 600 cm/h                                 |                            |                           |            |                                                                                                                                                                                               |

Prepacked columns and media for coupling ligands

| Ordering information | Product                                    |                    | Average particle diameter µm | Capacity/ substration per ml media     | Coupling conditions                          | Maximum operating flow rate <sup>1</sup> | Maximum operating pressure | pH stability <sup>3</sup> |            | Spacer <sup>6</sup> | Group to be coupled         |
|----------------------|--------------------------------------------|--------------------|------------------------------|----------------------------------------|----------------------------------------------|------------------------------------------|----------------------------|---------------------------|------------|---------------------|-----------------------------|
| Code No.             | Prepacked columns                          | Column size        |                              |                                        |                                              |                                          |                            | Long term                 | Short term |                     |                             |
| 17-0716-01           | HiTrap                                     | 5 × 1 ml           | 34                           | 10 µmol NHS groups                     | pH 6.5–9, 15–30 min, 4°C to room temperature | 4 ml/min                                 | 0.5MPa, 5 bar              | 3–12                      | 3–12       | 10-atom             | -NH <sub>2</sub>            |
| 17-0717-01           | NHS-activated HP                           | 1 × 5 ml           |                              |                                        |                                              |                                          |                            |                           |            |                     |                             |
|                      | Chromatography medium                      | Pack size          |                              |                                        |                                              |                                          |                            |                           |            |                     |                             |
| 17-0906-01           | NHS-activated Sepharose 4 FF <sup>7</sup>  | 25 ml <sup>6</sup> | 90                           | Approx. 18 µmol NHS groups             | pH 6–8, 2–16 h, 4°C to room temperature      | 400 cm/h                                 | 0.1 MPa, 1 bar             | 3–13                      | 3–13       | 14-atom             | -NH <sub>2</sub>            |
| 17-0981-01           | CNBr-activated Sepharose 4 FF <sup>7</sup> | 10 g <sup>6</sup>  | 90                           | 13–26 mg α-chymotrypsinogen            | pH 7–9, 2–16 h, 4°C to room temperature      | 400 cm/h                                 | 0.1 MPa, 1 bar             | 3–11                      | 3–11       | None                | -NH <sub>2</sub>            |
| 17-0430-01           | CNBr-activated Sepharose 4B                | 15 g <sup>6</sup>  | 90                           | 25–60 mg α-chymotrypsinogen            | pH 8–10, 2–16 h, 4°C to room temperature     | 75 cm/h                                  | 0.02 MPa, 0.2 bar          | 3–11                      | 3–11       | None                | -NH <sub>2</sub>            |
| 17-0490-01           | Activated CH Sepharose 4B                  | 15 g               | 90                           | > 8 µmol glycyl-leucine                | pH 5–10, 1–4 h, 4°C to room temperature      | 75 cm/h                                  | 0.02 MPa, 0.2 bar          | 2–11                      | 2–11       | 8-atom              | -NH <sub>2</sub>            |
| 17-0571-01           | ECH Sepharose 4B                           | 50 ml              | 90                           | 12–16 µmol carboxyl groups             | pH 4.5–6, 1.5–24 h, 4°C to room temperature  | 75 cm/h                                  | 0.02 MPa, 0.2 bar          | 3–14                      | 3–14       | 10-atom             | -NH <sub>2</sub>            |
| 17-0480-01           | Epoxy-activated Sepharose 6B               | 15 g <sup>6</sup>  | 90                           | 19–40 µmol epoxy groups                | pH 9–13, 16 h to several days, 20°C to 40°C  | 75 cm/h                                  | 0.03 MPa, 0.3 bar          | 2–14                      | 2–14       | 12-atom             | -NH <sub>2</sub> , -OH, -SH |
| 17-0569-01           | EAH Sepharose 4B                           | 50 ml <sup>6</sup> | 90                           | 7–11 µmol amino groups                 | pH 4.5–6, 1.5–24 h, 4°C to room temperature  | 75 cm/h                                  | 0.02 MPa, 0.2 bar          | 3–14                      | 3–14       | 11-atom             | -COOH, CHO                  |
| 17-0640-01           | Activated Thiol Sepharose 4B               | 15 g               | 90                           | 1 µmol activated thiol groups          | pH 4–8, 3–16 h, 4°C to room temperature      | 75 cm/h                                  | 0.02 MPa, 0.2 bar          | 2–8                       | 2–8        | 9-atom              | -SH                         |
| 17-0420-01           | Thiopropyl Sepharose 6B                    | 15 g               | 90                           | Approx. 20 µmol activated thiol groups | pH 4–8, 3–16 h, 4°C to room temperature      | 75 cm/h                                  | 0.03 MPa, 0.3 bar          | 2–8                       | 2–8        | 4-atom              | -SH                         |

HiTrap columns are ready to use prepacked 1 ml and 5 ml columns in a convenient format for laboratoryscale preparative purifications. They can be operated with a syringe, peristaltic pump, or liquid chromatography system such as ÄKTA.

HP = Sepharose High Performance

FF = Sepharose Fast Flow

1) Maximum linear operating flow rate is calculated from measurement in packed columns with a bed height of 10 cm and i.d. of 5 cm.

2) The ranges given are estimates based on our knowledge and experience. Please note the following:

i) pH stability, long term refers to the pH interval where the medium is stable over a long period of time without adverse effects on its subsequent chromatographic performance.

ii) pH stability, short term refers to the pH interval for regeneration, cleaning-in-place and sanitization procedures.

iii) Protein A and protein G may hydrolyze at low pH. Complete data on the stability of protein A and protein G as a function of pH are not available.

3) Data refer to the coupled product, provided that the ligand can withstand the pH.

4) The binding capacity values listed above are typical for the given species. However, there might be considerable deviations in binding capacity for different immunoglobulins derived from the same species, even if they are of the same subclass.

5) Spacer arms are used when coupling small molecules (M<sub>r</sub> < 1000). Spacer arms are generally not used for larger molecules (M<sub>r</sub> > 5000).

6) Process scale quantities are available. Please contact Cytiva for further information.

7) BioProcess Media

8) Special pack size delivered on specific customer order.

Ordering information

| Product                    |   | Pack size   | Code number |
|----------------------------|---|-------------|-------------|
| HiTrap rProtein A FF       | ■ | 5 × 1 ml    | 17-5079-01  |
| HiTrap rProtein A FF       | ■ | 2 × 1 ml    | 17-5079-02  |
| HiTrap rProtein A FF       | ■ | 100 × 1 ml* | 28-9464-89  |
| HiTrap rProtein A FF       | ■ | 1 × 5 ml    | 17-5080-01  |
| HiTrap rProtein A FF       | ■ | 5 × 5 ml    | 17-5080-02  |
| HiTrap Protein A HP        |   | 1 × 1 ml    | 29-0485-76  |
| HiTrap Protein A HP        |   | 5 × 1 ml    | 17-0402-01  |
| HiTrap Protein A HP        |   | 2 × 1 ml    | 17-0402-03  |
| HiTrap Protein A HP        |   | 1 × 5 ml    | 17-0403-01  |
| HiTrap Protein A HP        |   | 5 × 5 ml    | 17-0403-03  |
| HiTrap Protein G HP        |   | 1 × 1 ml    | 29-0485-81  |
| HiTrap Protein G HP        |   | 5 × 1 ml    | 17-0404-01  |
| HiTrap Protein G HP        |   | 2 × 1 ml    | 17-0404-03  |
| HiTrap Protein G HP        |   | 1 × 5 ml    | 17-0405-01  |
| HiTrap Protein G HP        |   | 5 × 5 ml    | 17-0405-03  |
| HiTrap Protein L           | ■ | 1 × 1 ml    | 29-0486-65  |
| HiTrap Protein L           | ■ | 5 × 1 ml    | 17-5478-51  |
| HiTrap Protein L           | ■ | 1 × 5 ml    | 17-5478-15  |
| HiTrap Protein L           | ■ | 5 × 5 ml    | 17-5478-55  |
| HiScreen Capto L           | ■ | 1 × 4.7 ml  | 17-5478-14  |
| HiTrap MabSelect           | ■ | 5 × 1 ml    | 28-4082-53  |
| HiTrap MabSelect           | ■ | 1 × 5 ml    | 28-4082-55  |
| HiTrap MabSelect           | ■ | 5 × 5 ml    | 28-4082-56  |
| HiTrap MabSelect SuRe      | ■ | 1 × 1 ml    | 29-0491-04  |
| HiTrap MabSelect SuRe      | ■ | 5 × 1 ml    | 11-0034-93  |
| HiTrap MabSelect SuRe      | ■ | 1 × 5 ml    | 11-0034-94  |
| HiTrap MabSelect SuRe      | ■ | 5 × 5 ml    | 11-0034-95  |
| HiTrap MabSelect Xtra      | ■ | 5 × 1 ml    | 28-4082-58  |
| HiTrap MabSelect Xtra      | ■ | 1 × 5 ml    | 28-4082-60  |
| HiTrap MabSelect Xtra      | ■ | 5 × 5 ml    | 28-4082-61  |
| HiScreen MabSelect         | ■ | 1 × 4.7 ml  | 28-9269-73  |
| HiScreen MabSelect Xtra    | ■ | 1 × 4.7 ml  | 28-9269-76  |
| HiScreen MabSelect SuRe    | ■ | 1 × 4.7 ml  | 28-9269-77  |
| HiScreen MabSelect SuRe LX | ■ | 1 × 4.7 ml  | 17-5474-15  |

| Product                          |   | Pack size   | Code number |
|----------------------------------|---|-------------|-------------|
| HiTrap Blue HP                   |   | 5 × 1 ml    | 17-0412-01  |
| HiTrap Blue HP                   |   | 1 × 5 ml    | 17-0413-01  |
| HiScreen Blue FF                 | ■ | 1 × 4.7 ml  | 28-9782-43  |
| HiScreen Capto Blue              | ■ | 1 × 4.7 ml  | 28-9924-74  |
| HiTrap Heparin HP                |   | 5 × 1 ml    | 17-0406-01  |
| HiTrap Heparin HP                |   | 1 × 5 ml    | 17-0407-01  |
| HiTrap Heparin HP                |   | 5 × 5 ml    | 17-0407-03  |
| HiTrap TALON crude               |   | 1 × 1 ml    | 29-0485-65  |
| HiTrap TALON crude               |   | 5 × 1 ml    | 28-9537-66  |
| HiTrap TALON crude               |   | 100 × 1 ml* | 28-9538-05  |
| HiTrap TALON crude               |   | 5 × 5 ml    | 28-9537-67  |
| HiTrap TALON crude               |   | 100 × 5 ml* | 28-9538-09  |
| HiPrep 16/10 Heparin FF          | ■ | 1 × 20 ml   | 17-5189-01  |
| HiTrap Benzamidine FF (high sub) |   | 5 × 1 ml    | 17-5143-01  |
| HiTrap Benzamidine FF (high sub) |   | 2 × 1 ml    | 17-5143-02  |
| HiTrap Benzamidine FF (high sub) |   | 1 × 5 ml    | 17-5144-01  |
| HiTrap NHS-activated HP          |   | 5 × 1 ml    | 17-0716-01  |
| HiTrap NHS-activated HP          |   | 1 × 5 ml    | 17-0717-01  |
| HisTrap HP                       |   | 1 × 1 ml    | 29-0510-21  |
| HisTrap HP                       |   | 5 × 1 ml    | 17-5247-01  |
| HisTrap HP                       |   | 100 × 1 ml* | 17-5247-05  |
| HisTrap HP                       |   | 1 × 5 ml    | 17-5248-01  |
| HisTrap HP                       |   | 5 × 5 ml    | 17-5248-02  |
| HisTrap HP                       |   | 100 × 5 ml* | 17-5248-05  |
| HisTrap FF                       | ■ | 5 × 1 ml    | 17-5319-01  |
| HisTrap FF                       | ■ | 100 × 1 ml* | 17-5319-02  |
| HisTrap FF                       | ■ | 5 × 5 ml    | 17-5255-01  |
| HisTrap FF                       | ■ | 100 × 5 ml* | 17-5255-02  |
| HisTrap FF crude                 | ■ | 1 × 1 ml    | 29-0486-31  |
| HisTrap FF crude                 | ■ | 5 × 1 ml    | 11-0004-58  |
| HisTrap FF crude                 | ■ | 100 × 1 ml* | 11-0004-59  |
| HisTrap FF crude                 | ■ | 5 × 5 ml    | 17-5286-01  |
| HisTrap FF crude                 | ■ | 100 × 5 ml* | 17-5286-02  |
| HisPrep FF 16/10                 | ■ | 1 × 20 ml   | 17-5256-01  |

| Product                    |   | Pack size       | Code number |
|----------------------------|---|-----------------|-------------|
| HiScreen Ni FF             | ■ | 1 × 4.7 ml      | 28-9798-44  |
| HisTrap excel              |   | 1 × 1 ml        | 29-0485-86  |
| HisTrap excel              |   | 5 × 1 ml        | 17-3712-05  |
| HisTrap excel              |   | 5 × 5 ml        | 17-3212-06  |
| HiTrap IMAC HP             |   | 5 × 1 ml        | 17-0920-03  |
| HiTrap IMAC HP             |   | 5 × 5 ml        | 17-0920-05  |
| HiTrap IMAC FF             | ■ | 5 × 1 ml        | 17-0921-02  |
| HiTrap IMAC FF             | ■ | 5 × 5 ml        | 17-0921-04  |
| HiPrep IMAC FF 16/10       | ■ | 1 × 20 ml       | 17-0921-06  |
| HiScreen IMAC FF           | ■ | 1 × 4.7 ml      | 28-9505-17  |
| HiTrap Chelating HP        |   | 5 × 1 ml        | 17-0408-01  |
| HiTrap Chelating HP        |   | 1 × 5 ml        | 17-0409-01  |
| HiTrap Chelating HP        |   | 5 × 5 ml        | 17-0409-03  |
| HiTrap Chelating HP        |   | 100 × 5 ml*     | 17-0409-05  |
| HiTrap Streptavidin HP     |   | 5 × 1 ml        | 17-5112-01  |
| HiTrap IgM Purification HP |   | 5 × 1 ml        | 17-5110-01  |
| HiTrap IgY Purification HP |   | 1 × 5 ml        | 17-5111-01  |
| GSTrap HP                  |   | 5 × 1 ml        | 17-5281-01  |
| GSTrap HP                  |   | 100 × 1 ml*     | 17-5281-05  |
| GSTrap HP                  |   | 1 × 5 ml        | 17-5282-01  |
| GSTrap HP                  |   | 5 × 5 ml        | 17-5282-02  |
| GSTrap HP                  |   | 100 × 5 ml*     | 17-5282-05  |
| GSTrap FF                  |   | 2 × 1 ml        | 17-5130-02  |
| GSTrap FF                  |   | 5 × 1 ml        | 17-5130-01  |
| GSTrap FF                  |   | 100 × 1 ml*     | 17-5130-05  |
| GSTrap FF                  |   | 1 × 5 ml        | 17-5131-01  |
| GSTrap FF                  |   | 5 × 5 ml        | 17-5131-02  |
| GSTrap FF                  |   | 100 × 5 ml*     | 17-5131-05  |
| GSTPrep FF                 |   | 16/10 1 × 20 ml | 17-5234-01  |
| GSTrap 4B                  |   | 1 × 1 ml        | 29-0486-09  |
| GSTrap 4B                  |   | 5 × 1 ml        | 28-4017-45  |
| GSTrap 4B                  |   | 100 × 1 ml*     | 28-4017-46  |
| GSTrap 4B                  |   | 1 × 5 ml        | 28-4017-47  |
| GSTrap 4B                  |   | 5 × 5 ml        | 28-4017-48  |

| Product                  |   | Pack size   | Code number |
|--------------------------|---|-------------|-------------|
| GSTrap 4B                |   | 100 × 5 ml* | 28-4017-49  |
| MBPTrap HP               |   | 1 × 1 ml    | 29-0486-41  |
| MBPTrap HP               |   | 5 × 1 ml    | 28-9187-78  |
| MBPTrap HP               |   | 1 × 5 ml    | 28-9187-79  |
| MBPTrap HP               |   | 5 × 5 ml    | 28-9187-80  |
| StrepTrap HP             |   | 1 × 1 ml    | 29-0486-53  |
| StrepTrap HP             |   | 5 × 1 ml    | 28-9075-46  |
| StrepTrap HP             |   | 1 × 5 ml    | 28-9075-47  |
| StrepTrap HP             |   | 5 × 5 ml    | 28-9075-48  |
| Kits (including buffers) |   |             | Code number |
| MABTrap Kit              |   |             | 17-1128-01  |
| HisTrap FF crude Kit     | ■ |             | 28-4014-77  |

Chromatography media

| Product                               |   | Pack size | Code number |
|---------------------------------------|---|-----------|-------------|
| Protein A Sepharose CL-4B             |   | 1.5 g     | 17-0780-01  |
| Protein A Sepharose CL-4B             |   | 25 ml     | 17-0963-03  |
| nProtein A Sepharose 4 FF             | ■ | 5 ml      | 17-5280-01  |
| nProtein A Sepharose 4 FF             | ■ | 25 ml     | 17-5280-04  |
| rProtein A Sepharose FF               | ■ | 5 ml      | 17-1279-01  |
| rProtein A Sepharose FF               | ■ | 25 ml     | 17-1279-02  |
| Protein G Sepharose 4 FF              | ■ | 5 ml      | 17-0618-01  |
| Protein G Sepharose 4 FF              | ■ | 25 ml     | 17-0618-02  |
| GammaBind G Sepharose                 |   | 5 ml      | 17-0885-01  |
| GammaBind G Sepharose                 |   | 25 ml     | 17-0885-02  |
| GammaBind Plus Sepharose              |   | 5 ml      | 17-0886-01  |
| GammaBind Plus Sepharose              |   | 25 ml     | 17-0886-02  |
| MabSelect                             | ■ | 25 ml     | 17-5199-01  |
| MabSelect SuRe                        | ■ | 25 ml     | 17-5438-01  |
| MabSelect SuRe LX                     | ■ | 25 ml     | 17-5474-01  |
| MabSelect Xtra                        | ■ | 25 ml     | 17-5269-07  |
| Immunoprecipitation Starter Pack      | ■ | 2 × 2 ml  | 17-6002-35  |
| 2´5´ ADP Sepharose 4B                 |   | 5 g       | 17-0700-01  |
| Benzamidine Sepharose 4 FF (high sub) |   | 25 ml     | 17-5123-01  |

\* Special pack size delivered on specific customer order

Ordering information

| Product                    |   | Pack size | Code number |
|----------------------------|---|-----------|-------------|
| Blue Sepharose 6 FF        | ■ | 50 ml     | 17-0948-01  |
| Capto Blue                 | ■ | 25 ml     | 17-5448-01  |
| Capto L                    | ■ | 5 ml      | 17-5478-06  |
| Capto L                    | ■ | 25 ml     | 17-5478-01  |
| Calmodulin Sepharose 4B    |   | 10 ml     | 17-0529-01  |
| TALON Superflow            |   | 10 ml     | 28-9574-99  |
| TALON Superflow            |   | 50 ml     | 28-9575-02  |
| Ni Sepharose HP            |   | 25 ml     | 17-5268-01  |
| Ni Sepharose HP            |   | 100 ml    | 17-5268-02  |
| Ni Sepharose 6 FF          | ■ | 5 ml      | 17-5268-06  |
| Ni Sepharose 6 FF          | ■ | 25 ml     | 17-5318-01  |
| Ni Sepharose 6 FF          | ■ | 100 ml    | 17-5318-02  |
| Ni Sepharose 6 FF          | ■ | 500 ml    | 17-5318-03  |
| Ni Sepharose excel         |   | 100 ml    | 17-3712-02  |
| Ni Sepharose excel         |   | 500 ml    | 17-3212-03  |
| IMAC Sepharose HP          |   | 25 ml     | 17-0920-06  |
| IMAC Sepharose HP          |   | 100 ml    | 17-0920-07  |
| IMAC Sepharose 6 FF        | ■ | 25 ml     | 17-0921-07  |
| IMAC Sepharose 6 FF        | ■ | 100 ml    | 17-0921-08  |
| Chelating Sepharose FF     | ■ | 50 ml     | 17-0575-01  |
| Con A Sepharose 4B         |   | 5 ml      | 17-0440-03  |
| Con A Sepharose 4B         |   | 100 ml    | 17-0440-01  |
| Gelatin Sepharose 4B       |   | 25 ml     | 17-0956-01  |
| Glutathione Sepharose HP   |   | 25 ml     | 17-5279-01  |
| Glutathione Sepharose HP   |   | 100 ml    | 17-5279-02  |
| Glutathione Sepharose 4 FF |   | 25 ml     | 17-5132-01  |
| Glutathione Sepharose 4 FF |   | 100 ml    | 17-5132-02  |
| Glutathione Sepharose 4 FF |   | 500 ml    | 17-5132-03  |
| Glutathione Sepharose 4B   |   | 10 ml     | 17-0756-01  |
| Glutathione Sepharose 4B   |   | 100 ml    | 17-0756-05  |
| Glutathione Sepharose 4B   |   | 300 ml    | 17-0756-04  |
| Dextrin Sepharose HP       |   | 25 ml     | 28-9355-97  |
| Dextrin Sepharose HP       |   | 100 ml    | 28-9355-98  |
| StrepTactin Sepharose HP   |   | 10 ml     | 28-9355-99  |
| StrepTactin Sepharose HP   |   | 50 ml     | 28-9356-00  |

| Product                       |   | Pack size | Code number |
|-------------------------------|---|-----------|-------------|
| Heparin Sepharose 6 FF        | ■ | 50 ml     | 17-0998-01  |
| IgG Sepharose 6 FF            |   | 10 ml     | 17-0969-01  |
| Lentil Lectin Sepharose 4B    |   | 25 ml     | 17-0444-01  |
| Lysine Sepharose 4B           |   | 15 g      | 17-0690-01  |
| Streptavidin Sepharose HP     |   | 5 ml      | 17-5113-01  |
| Activated CH Sepharose        |   | 15 g      | 17-0490-01  |
| CNBr-activated Sepharose 4B   |   | 15 g      | 17-0430-01  |
| CNBr-activated Sepharose 4 FF | ■ | 10 g      | 17-0981-01  |
| EAH Sepharose 4B              |   | 50 ml     | 17-0569-01  |
| ECH Sepharose 4B              |   | 50 ml     | 17-0571-01  |
| Epoxy-activated Sepharose 6B  |   | 15 g      | 17-0480-01  |
| NHS-activated Sepharose 4 FF  | ■ | 25 ml     | 17-0906-01  |
| Activated Thiol Sepharose 4B  | ■ | 15 g      | 17-0640-01  |
| Thiopropyl Sepharose 6B       |   | 15 g      | 17-0420-01  |

Technical information\*

| Documentation                                                                 | Code number |
|-------------------------------------------------------------------------------|-------------|
| <i>Handbooks and guides with detailed technical information:</i>              |             |
| Affinity Chromatography Handbook, Principles and Methods                      | 18-1022-29  |
| Antibody Purification Handbook                                                | 18-1037-46  |
| Recombinant Protein Purification Handbook, Principles and Methods             | 18-1142-75  |
| GST Gene Fusion System Handbook                                               | 18-1157-58  |
| Prepacked Chromatography Columns for ÄKTA systems, Selection guide            | 28-9317-78  |
| Total solutions for preparation of histidine-tagged proteins, Selection guide | 28-4070-92  |
| Solutions for protein preparation and detection of GST-tagged proteins        | 28-9168-33  |
| Solutions For Antibody Purification Selection guide                           | 28-9351-97  |

\* Technical information can be downloaded from [www.cytiva.com](http://www.cytiva.com)  
■ BioProcess Media

BioProcess Media

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- Scalable from lab to production
- With comprehensive documentation
- Meeting productivity requirements
- Having validated manufacturing procedures
- With developed CIP and sanitization-in-place procedures
- Offering security of supply

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