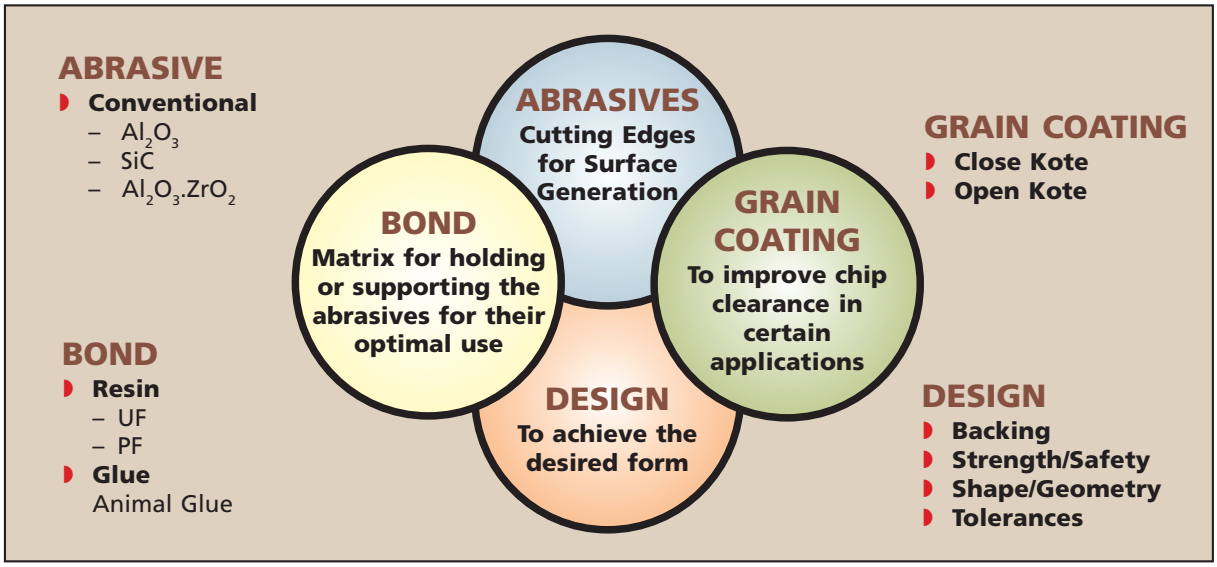
# GENERAL INFORMATION

Coated abrasive products are basically Engineered Composites consisting of three basic elements – a flexible, semi-rigid or rigid backing onto which abrasive grains are adhered by two layers of bond.




Coated abrasive products are primarily used for surface preparation and straddle a wide variety of applications across industry segments.

In order to choose the right coated abrasive product for any application, it is important to select the right combination of the constituent elements. This section gives a brief overview of the various constituent elements of a coated abrasive product and their nomenclature.

## BACKINGS

Backing supports or provides the foundation for the abrasive grain and because it is flexible, it allows the abrasive grain to be applied to the surface in a variety of ways. Backings are flexible or semi rigid. They need to be smooth for uniform coating and strong enough to withstand grinding pressure. The common backings are:

- Paper
- Cloth
- Fibre
- Combination
- Wide Mesh Cloth
- Film

### Paper Backing

Paper backings are available in various weights to suit different applications.

| Type | Weight | End Use |
|---|---|---|
| A | 70 gsm | Hand sanding |
| B | 90 gsm | Hand sanding |
| C | 110 gsm | Hand sanding |
| D | 150 gsm | M/C use – discs |
| E | 220 gsm | M/c use - belts/discs/rolls |
| F | 250 gsm | M/c use - belts/discs/rolls |

### Cloth Backing

Cloth backings are rougher and more durable than paper backing. They too are available in different strengths to suit different applications.

| Type | Properties | Weight | End Use |
|---|---|---|---|
| J | Flexible | 170 gsm | For grinding contoured jobs |
| X | Strong | 260 gsm | For medium to high pressure applications |
| Y | Very Strong | 310 gsm | For very high pressure applications |
| H | Heavy Duty | | Strongest cloth backing for extreme pressure & heavy stock removal operations. |

### Fibre Backing

Fibre backings are made of several layers of impregnated paper with a semi-rigid backing and are used for portable disc grinding.

| Type | End Use |
|---|---|
| 0.8 mm thick | High pressure |
| 0.6 mm thick | Light pressure/ finishing applications |

## Combination Backing

Consists of light weight cloth laminated over a C weight paper and is used only for select wide belt applications.

## Screen-bak

Consists of synthetic cloth mesh, coated with abrasive grains and bonded with waterproof resin.

## Polyester Film

Polyester film backings have thickness with very tight tolerance and provide very uniform coating surfaces to meet the needs of specialized applications.

# BONDS

The adhesive used to bond the abrasive grain onto the backing plays a crucial role in the performance of the coated abrasive. The adhesive bond holds the abrasive grain in place on the backing till it is used up.

It is applied in two coats. The first coat or "make coat" adheres the grains to the backing ensuring proper orientation and the second coat or the "size coat" gives the strength. There are two types of adhesives – animal hyde glue and synthetic resins.

| Type | Property | End Use |
|---|---|---|
| Glue over Glue (G/G) | Very soft, flexible, low heat/ water resistance | Finishing, polishing applications |
| Resin over Glue (R/G) | Medium strength and flexibility | Better strength than glue |
| Resin over Resin (R/R) | High strength, heat, water resistance | Highest strength, life, first preference for general applications |

| BONDS | | | |
|---|---|---|---|
| | **STRENGTH** | **WATER/ HEAT RESISTANCE** | **RMS (FINISH)** high - poor finish low - good finish |
| G/G | WEAK | LEAST | LOW |
| R/G | | | |
| R/R | STRONG | MOST | HIGH |

↕ - Increasing or decreasing trend of the parameter

# ABRASIVE GRAINS

Abrasive grains form the cutting edge to grind or polish material. Each grain in turn has a number of cutting edges which form basic wedges for metal removal. These materials are selected on their ability to cut through or abrade the work material and are available in different varieties. Abrasive grains used in Coated Abrasive products can be classified into Natural & Synthetic abrasive grains.

**Natural**

- Garnet (almandite)
- Emery (corundum)
- Crocus (iron oxide)

**Synthetic**

- Zirconia Alumina
- Ceramic Aluminum Oxide
- Silicon Carbide
- Aluminum Oxide

| Type | Property | End Use |
|---|---|---|
| Zirconia - Alumina | Hard, tough, self sharpening | High pressure, heavy stock removal applications. Very good results on Stainless Steel |
| Seeded Gel | Hard, tough, micro-fracture | High pressure, heavy stock removal operations. Excellent for Carbon Steels and Aerospace Alloys |
| Silicon Carbide | Hard, sharp | Suitable for very hard materials or non-ferrous materials |
| Aluminum Oxide | Tough, blocky | Best for general purpose applications and on metals too |
| Emery | Blocky | Low end polishing operations |
| Garnet | Sharp, low strength | Wood sanding |
| Flint | Low strength | Wood sanding |

## Abrasive grain properties

**Hardness:** Hardness of an Abrasive grain is its ability to abrade the material being ground.

**COMPARISON OF HARDNESS**

| ABRASIVES | |
|---|---|
| | Silicon Carbide |
| | Seeded Gel |
| | Aluminum Oxide |
| | Zirconia Alumina |
| | Emery |
| | Garnet |
| | Flint |
| | Crocus |

HARD

SOFT

**Toughness:** Toughness of an Abrasive grain is its ability to resist excessive pressure exerted on it without rapidly crumbling and breaking down.

**COMPARISON OF TOUGHNESS**

| ABRASIVES | |
|---|---|
| | Zirconia Alumina |
| | Aluminum Oxide |
| | Seeded Gel |
| | Silicon Carbide |
| | Garnet |
| | Emery |
| | Crocus |
| | Flint |

HIGH

LOW

↕ - Increasing or decreasing trend of the parameter

**Friability:** During grinding, the abrasive grain wears out, becomes dull and stops cutting, thus generating heat. After the grain has dulled, grinding forces and heat generation increases, the grain fractures and breaks up exposing fresh cutting edges. This property of the grain to fracture itself during the grinding process is friability.

**Zirconia Alumina –**

Zirconia Alumina features a unique self sharpening characteristic which provides long life in rugged stock removal operations. These grains break up when pressure is applied into long splintery edges and hence retains a sharp corner and excellent grain shape during the entire grinding operation. Zirconia Alumina grain combines grain toughness with friability making it the best choice for high pressure grinding applications. However it is best suited for coarse grit tough applications.

**Seeded Gel -**

SG grains are produced by a unique ceramic and chemical process that produces a dense, hard and tough abrasive. SG grain has millions of small sharp edged crystals which break up into fresh small corners. SG grain is also very friable as compared to NorZon range but lacks the toughness.

**Silcon Carbide -**

SiC grain is very hard and splintery and has very low toughness. It just crumbles up. Due to low toughness SiC is used mostly as an abrading grain and is not used for heavy material removal of specially tough materials like steels.

**Aluminum Oxide -**

AlO grain is very tough and wedged shaped. AlO is the first general choice for most tough applications. It is not very friable and dulls off. It allows a high speed penetration of tough materials without excessive fracturing or shedding.

NORTON ADVANTAGE

## Abrasive Characteristics - Snapshot

| | AlO Brown | AlO White | Zirconia | SiC | SG |
|---|---|---|---|---|---|
| **Colour** | Brown | White | Blue | Black | |
| **Shape** | Blocky | Blocky | Long & Sharp | Irregular & sharp | Sharp & round |
| **Hardness** | ↑ | ↑↑ | ↑↑ | ↑↑↑↑ | ↑↑ |
| **Friability** | ↑ | ↑↑↑ | ↑↑↑↑ | ↑↑↑↑ | ↑↑↑↑ |
| **Toughness** | ↑↑↑↑ | ↑↑ | ↑↑↑↑ | ↑ | ↑↑↑ |

↑ - Poor ↑↑↑↑ - Good

## Grain Size

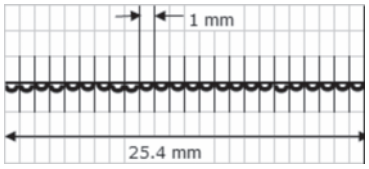
Abrasive grains are graded into standard particle sizes using sieves. The grit number of the abrasive represents the number of openings per linear inch of the sieve. There are three popular industry standards namely CAMI (Coated Abrasive Manufacturing Institute of USA), FEPA (Federation of European Producer of Abrasives) and JIS (Japanese Industrial Standards). A comparative chart is given on Page C 8. We follow the FEPA standard.

## Grit Size

Number of openings per linear inch.

FEPA Scale

$24\ \text{Grit} = \frac{25{,}4}{24} = 1\ \text{mm}$




## Abrasive Grain Coverage

Coated Abrasive products are generally manufactured in two levels of grain density – open coat and close coat.

**OPK : Openkote**

30-60% of backing surface is covered; the spaces between the grains facilitate the removal of chips. Used for "clogging or loading" materials like wood.

**CLK : Closekote**

80-100% of the backing surface is covered. Offers the greatest number of cutting edges.

## SPECIAL TREATMENTS

Some products receive special treatment to make them even more suitable to certain applications.

**No-Fil Treatment**

In order to provide resistance to loading, some products are given a special additional layer of Stearate.

**PSA Treatment**

Some products have a special Pressure-Sensitive Adhesive coating on the backing to facilitate easy fastening on back-up pads, rotating plates and grinder etc.

**Satining Treatment**

Satining is the pressure leveling of the coated abrasive surface by passing it between steel rollers. All abrasive grains are levelled (crushed) thus making absolutely sure that no scratching takes place. Satining is only rarely done for fine grit abrasives and in special cases, where a scratch-free finish is imperative. Satining reduces the life of the abrasive.

**Super Size Treatment**

Some high performance metal working products are manufactured with a size coat designed to:

a) React with the work material and make it easier to grind, or

b) To act as a lubricant and prevent burning of the work piece.

## FLEXING

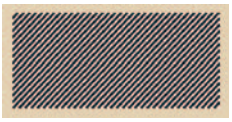
Flexing is the controlled breaking of adhesive bond with an aim of varying the flexibility and aggressiveness of the product. The direction, spacing and sensitivity are carefully controlled. Since flexing breaks the continuity of the bond and thus reducing the strength, minimum flexing is always desirable, unless the application requires greater flexibility.

All products are given with a standard flexing which is most appropriate.

**Singleflex :** The bond is broken at a 90° angle to the length. The abrasive product is stiff in one direction and flexible in the other. Singleflex is standard on most X-weight products.

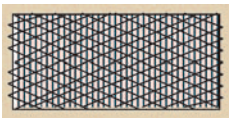
Run direction →

**Doubleflex:** The bond is broken at two 45° angles to the length. This flex is desirable for sanding shapes and contours, such as moldings. It is standard on most J-weight products.



Run direction →

**Tripleflex:** A combination of Singleflex and Doubleflex. It is specified on applications requiring maximum product conformability, such as sanding irregular contours.



Run direction →

## BELT JOINTS

Belt joints are a crucial part of the coated abrasive product and need to perform consistently in line with the various end uses of the coated abrasive. Keeping this in mind, various types of joints have been designed. They broadly fall into two categories.

### Lap joint

Lap joints are formed by overlapping and sticking the two ends of the coated abrasive to each other. Depending on the application and the grit of the product, modifications are available. Belts with Lap Joint can run only in one direction.

**NTS (NO TOP SKIVE) –** No grain is removed from the top of the joint thereby providing maximum resistance to shedding. This is done for coarse grits.

**FTS (FULL TOP SKIVE) –** All the grain is removed from the top of the joint for bump free operation.

### Butt joint

Butt joints are formed by butting the two ends of the abrasive material without overlapping. A thin strong adhesive tape is bonded to the print side of the joint. Since there is no overlap, the joint is bump free and can be run in both directions.

Standard Butt Joint

Butt straight with tape on grain side for special applications

### Norlok joint

This is a special type of butt joint where two ends of the abrasive material are cut in an interlocking sinusoidal pattern that offers resistance to hinging and joint fatigue.

## PRODUCT IDENTIFICATION SYSTEM

**Norton coated abrasive products are identified by the product name followed by a four character code consisting of a letter and 3-digits (example: Alkon R209). Referred to as the CAP (Coated Abrasive Product) Code, it has been adopted as a means of simplifying and standardizing the product nomenclature. Each character and its position is meaningful, as follows:**


### Position 1

**Principal Backing/Bond**

| | |
|---|---|
| **A** | Light Paper Paper A-D Weights excludes Waterproof |
| **F** | Fibre |
| **G** | Heavy Paper Glue Bond, E, F Weights |
| **H** | Heavy Paper Resin Bond E, F Weights |
| **K** | Cloth Glue Bond J, X Weights |
| **Q** | Various (Polyester, Film, Screen-Bak) |
| **R** | Cloth Resin Bond H, J, X, Y Weights |
| **S** | Combination and Sateen Cloth (S Weight) |
| **T** | Waterproof Paper A, B, C Weights |
| **W** | Waterproof Cloth X Weight |

### Position 2

**Abrasive**

| | |
|---|---|
| **1** | Aluminium Oxide, White |
| **2** | Aluminium Oxide, Brown |
| **3** | Unassigned |
| **4** | Silicon Carbide |
| **5** | Garnet |
| **6** | Emery, Crocus |
| **7** | Flint, Glass |
| **8** | Zirkonia Alumina (NZ Alundum) |
| **9** | Norton SG Ceramic Aluminium Oxide |
| **0** | Others |

### Position 3

**Coating**

| | |
|---|---|
| **1** | Openkote |
| **2** | Closekote |
| **3** | Openkote |
| **4** | Closekote |
| **5** | Openkote |
| **6** | Closekote |
| **7** | Openkote |
| **8** | Closekote |
| **9** | Openkote |
| **0** | Closekote |

### Position 4

**Random**

Designates different products within the same product group. For example Alkon R229 and Alkon R209 are Closecote Aluminium Oxide Cloth products with different designs

Note: Certain products that are being sourced from our affiliates across the world come with specifications that do not comply with the above nomenclature system.

## GRIT SIZE GRADING SYSTEMS

| CAMI | U.S. scale | | | |
|---|---|---|---|---|
| FEPA | European scale | | | |
| JIS | Japanese scale | | | |
| **CAMI mesh** | **(P) FEPA mesh** | **JIS mesh** | **Average Micron Size** | **Emery Products** |
| | | | 5.0 | |
| | | 3000 | 5.4 | |
| 1200 | | 2500 | 6.5 | 4/0 |
| | P2500 | | 8.4 | |
| | | 2000 | 8.2 | |
| 1000 | | | 9.2 | 3/0 |
| | | 1500 | 10.5 | |
| 800 | | 1200 | 12.2 | |
| | P1500 | | 12.6 | |
| | | | 15.0 | |
| | 1200 | 1000 | 15.3 | |
| 600 | | | 16.0 | 2/0 |
| | | | 18.3 | |
| | P1000 | 800 | 18.3 | |
| 500 | | | 19.7 | 0 |
| | | | 20.0 | |
| | P800 | | 21.8 | |
| 400 | | 600 | 23.6 | |
| | | | 25.0 | |
| | P600 | | 25.75 | |
| 360 | | 500 | 28.8 | |
| | P500 | | 30.0 | |
| | P400 | 400 | 35.0 | |
| 320 | | | 36.0 | |
| | | 360 | 40.0 | |
| | P360 | | 40.5 | |
| 280 | | | 44.0 | 1 |
| | | | 45.0 | |
| | P320 | 320 | 46.2 | |
| | | | 50.0 | |
| | P280 | 280 | 52.5 | |
| 240 | | | 53.5 | |
| | | | 55.0 | |
| | P240 | | 58.5 | |
| | | 240 | 60.0 | |
| | | | 64.0 | 2 |
| | P220 | 220 | 65.0 | |
| 220 | | | 66.0 | |
| 180 | P180 | 180 | 78.0 | |
| | | | 79.0 | 3 |
| 150 | | 150 | 93.0 | |

| CAMI | 600 | | | |
|---|---|---|---|---|
| FEPA | P1200 | Approx. same grit size | | |
| JIS | 1000 | | | |
| **CAMI mesh** | **(P) FEPA mesh** | **JIS mesh** | **Average Micron Size** | **Emery Products** |
| | | | 95.0 | Fine |
| | | | 97.0 | |
| 120 | | 120 | 116.0 | |
| | P120 | 100 | 127.0 | |
| | | | 136.0 | Medium |
| 100 | | | 141.0 | |
| | P100 | | 156.0 | |
| | | | 189.0 | Coarse |
| 80 | | 80 | 192.0 | |
| | P80 | | 197.0 | |
| | P60 | | 260.0 | |
| 60 | | 60 | 268.0 | 2/0 |
| | P50 | 50 | 326.0 | |
| | | | 341.0 | Ex.Coarse |
| 50 | | | 351.0 | |
| | P40 | 40 | 412.0 | |
| 40 | | | 428.0 | |
| | P36 | | 524.0 | |
| 36 | | 36 | 535.0 | |
| | P30 | | 622.0 | |
| 30 | | 30 | 638.0 | |
| 24 | | | 715.0 | |
| | P24 | 24 | 740.0 | |
| 20 | | | 905.0 | |
| | P20 | 20 | 984.0 | |
| 16 | | 16 | 1320.0 | |
| | P16 | | 1324.0 | |
| | P12 | | 1764.0 | |
| 12 | | | 1862.0 | |

NORTON ADVANTAGE

## SAINT-GOBAIN CAP, GRIT & SHAPE AVAILABILITY LIST

| CAP | BRAND | GRITS | SHAPES |
|---|---|---|---|
| F224 | Norton Alkon Gold | 24, 36, 50, 60, 80, 120 | Discs |
| F223 | Bear | 36, 60, 80, 100, 120 | Discs |
| F221 | Norton Alkon Super | 120 | Discs |
| F422 | Norton Silkon - Wood Working | 36 & 60 | Discs |
| F424 | Norton Silkon - Wood Working | 80 & 120 | Discs |
| F822 | Norton Zirkon | 24, 36, 60, 80, 120 | Discs |
| R209 | Norton Alkon Premium | 36 | Flap Wheels, Belts |
| R209 | Norton Alkon Premium | 60, 80, 100,120 | Belts, Rolls, Discs (PSA, Velcro) |
| R229 | Norton Alkon | 220 | Belts |
| R208 | Norton Alkon | 60 | Belts |
| R265 | Norton Alkon | 36, 50, 60, 80, 100, 120, 150, 180, 220, 320, 400, 600 | Belts, Rolls, Discs (PSA, Velcro), Flap Wheels |
| R409 | Norton Silkon | 24, 36, 50,60, 80, 100, 120 | Belts, Rolls |
| R809 | Norton Zirkon | 36, 60, 80 | Belts, Rolls, Discs (Velcro) |
| R824 | Norton Zirkon | 120 | Discs (Velcro) |
| R223 | Norton Sand-It-All | 50, 60, 80, 100, 120 | Rolls |
| K622 | Norton Laser | E Coarse, Coarse, Medium, Fine, E. Fine | Sheets, Rolls |
| H920 | Norton SG | P60, P80, P100, P120 | Discs |
| H231 | Norton Adalox | P40, P60, P80, P100, P120 | Belts |
| H189 | Norton Adalox | P150, P180, P220, P240, P280, P320, P400 | Belts |
| H221 | Alkon | 120, 150, 180, 220, 240, 320, 400, 600 | Rolls - 10 Inch, 12 Inch, 24 Inch |
| BE26 | Norton Vibrator | 150, 180, 220, 240, 320, 400, 500, 600, 800, 1000 | Rolls - 10 Inch, 12 Inch, 24 Inch |
| A275 | Norton No-Fil | P80, P100, P120, P150, P180, P220, P240, P280, P320, P400, P500, P600, P800, P1000, P1500 | Discs (Velcro), PSA Discs Rolls, Sheets |
| A270 | Norton Adalox | P80, P100, P120, P150, P180, P220, P240, P280, P320, P400, P500, P600, P800, P1000, P1500 | Discs (Velcro), PSA Discs, Rolls, Sheets |
| A219 | Norton No-Fil | 80, 100, 120, 150, 180, 220, 240, 280, 320, 400 | Sheets |
| A290 | Norton No-Fil Adalox | 60, 80, 100, 120, 150, 180, 320, 400 | Discs (Velcro), PSA Discs Rolls, Sheets |
| A413 | Norton Dri-Lub SiC | 80, 100, 120, 150, 180, 220, 240, 320, 400 | Sheets |
| Q151 | Norton Metalite | 100, 80, 60, 50, 40, 30, 20, 15, 9, 7 µ | Rolls |
| Q153 | Norton Metalite | 100, 80, 60, 50, 40, 30, 20, 15, 9, 7 µ | Rolls |
| SX595 | Cora | P60, P80, P100, P120, P150, P180, P240, P320, P400 | Belts, Discs (Velcro) |
| SX590 | Cora | P60, P80, P120, P150, P180, P240, P320, P400 | Belts, Discs (Velcro) |
| SY692 | Cora | P24, P30, P36, P40, P50, P60, P80, P100, P120 | Belts |
| SY890 | Cora | P80, P100, P120, P150, P180 | Belts |
| S88XL | Cora | P24, P36, P40, P80, P100, P120 | Belts |
| S88 XX | Cora | P24, P36, P40,P50,P60 | Belts |
| S88 YY | Cora | P50, P60, P80, P100, P120, P150, P180 | Belts |
| R822 | Norton Norfiber | P40, P60, P80 | Flap-Discs |

## APPLICATION GUIDE

| | | PRODUCT SHAPES | | | | | | | | APPLICATIONS | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GRITS AVAILABLE | CAP CODE | WIDE BELTS | NARROW BELTS | ROLLS | FIBRE DISCS | FLAPWHEELS | SHEETS | PSA DISCS | VELCRO DISCS | HAND TOOLS | SANITARY WARE | WATCH | AI CASTINGS | COIL GRINDING | STRIP GRINDING | GLASS | DIARY | CASTINGS/FORGINGS | TURBINE BLADES | PLYWOOD SANDING | FURNITURE | MDF (WIDE BELT) | LEATHER | SHOE | LAMINATES | SPECIMEN POLISHING | TEXTILE | TYRE TREAD | CRANKSHAFT | BODY SHOP | PAINT SHOP |
| 24 ~ 120 | F224 | | | | ■ | | | | | | | | | | | | | ■ | | ■ | | | | | | | | | | ■ | |
| 24 ~ 120 | F822 | | | | ■ | | | | | | | | | | | | | ■ | | | | | | | | | | | | ■ | |
| 36 ~ 60 | F422 | | | | ■ | | | | | | | | | | | | | | | | ■ | | | | | | | | | | |
| 80 - 120 | F424 | | | | ■ | | | | | | | | | | | | | | | | ■ | | | | | | | | | | |
| 80 - 800 | G403 | | | ■ | | | | | | | | | | | | | | | | | | | ■ | | | | | | | | |
| 120 ~ 400 & 600 | H221 | ■ | | ■ | | | | | ■ | | | | | | | | | | | ■ | ■ | ■ | ■ | | | | ■ | | | | |
| 24 ~ 80, 150 | K622 | | | ■ | | | ■ | | | | | | | | | | | | | | ■ | | | | | | | | | | |
| 60 ~ 120 | R223 | | | ■ | | | ■ | | | | | | | | | | | | | ■ | ■ | | | | | | | | | | |
| 220 | R229 | | ■ | | | | | | | | ■ | | | ■ | ■ | ■ | | | ■ | | | | | | | | | | | | |
| 36 ~ 120 | R209 | | ■ | ■ | | | | ■ | ■ | ■ | | ■ | | | | ■ | | | ■ | ■ | | | | ■ | | | | | | ■ | |
| 60 ~ 600 | R265 | | ■ | ■ | | ■ | | | ■ | | | | | | | | ■ | | ■ | | | | | | | | ■ | | | ■ | |
| 24 ~ 180 | R409 | ■ | | ■ | | | | | | | | | | ■ | | ■ | | | | | | ■ | | | ■ | | | ■ | | | |
| 36, 60, 80 | R809 | ■ | ■ | | | | | | ■ | ■ | | | | ■ | | | | ■ | ■ | | | | | | | | | ■ | | ■ | |
| 36 ~ 400 | A257 | | | | | | ■ | | | | | | | | | | | | | | ■ | | | | | | | | | | |
| P320 ~ P800 | A270 | | | | | | ■ | ■ | ■ | | | | | | | | | | | | | | | | | | | | | | ■ |
| P80 ~ P800 | A275 | | | ■ | | | ■ | ■ | ■ | | | | | | | | | | | | ■ | | | | | | | | | | ■ |
| P320 ~ P600 | A255 | | | | | | | | ■ | | | | | | | | | | | | | | | | | | | | | | ■ |
| P36 - P120 | H231 | ■ | | | | | | | | | | | | | | | | | | ■ | | | | | | | | | | | |
| P150 ~ P400 | H189 | ■ | | | | | | | | | | | | | | | | | | ■ | | | | | | | | | | | |