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Sanding/Pretreatment basics:

When a substrate is to be coated the surface **pre-treatment** is crucial. The better and more precise the preparation e.g. cleaning, sanding of the surface and the final cleaning process, the better adhesion properties can be expected.
There is a well-known saying in our industry:
"A painted surface is only as good as the underlying prepared ground!"

Grinding/Sanding is a method for surface pretreatment which can be performed manually or mechanically. The process is used to create a desired shape and/or surface roughness through removal of material, rust removal, deburring, smoothing, coarse / fine sanding, roughing, polishing, etc. of metal workpieces, coated components, wood and mineral objects. Proper grinding/sanding will effectively increase the contact area for optimum adhesion of the coatings.

Overview of the most common abrasives:

Sandpaper, grinding wheels, sanding fleeces, abrasive cloth (fabric), abrasive belts (endless) and sanding discs.
For the particular grinding job the abrasive or the grain must meet various requirements, such as grain hardness criteria and cutting ability, long service life, no or low heat development, uniform distribution of the grains on the sanding paper, etc.

- The abrasives are divided into natural and synthetic materials. Natural grain materials e.g. Garnet, quartz and natural corundum are of little use, primarily due to their insufficient strength properties (except for the natural diamond)!
- Synthetic abrasive such as corundum, silicon carbide, boron nitride, boron carbide and diamond are used because of their excellent properties for almost all grinding operations.
- Corundum is the most commonly used medium due to its excellent hardness and toughness Depending on the composition of the properties, Corundum is almost 100% white aluminum oxide (9.4 Mohs), and with its remarkable hardness, it can attack virtually any material right from the start. The grain shape is blocky with straight cutting edges.
- Silicon carbide (9.6 Mohs) is next to diamond and boron carbide the hardest abrasive grain. It features long and free-cutting edges, ideal shapes for an abrasive grain. With a lower toughness, the wear resistance is somewhat lower than that of aluminum oxide (Corundum). It is an excellent medium for use with soft materials.

We recommended:

- Aluminum oxide (noble corundum white) for hard materials
- Silicon carbide for soft materials

In the production of the grinding material, an electro-static process is applied to bond the abrasive grains with the glued pad. This technique provides for a perfect orientation of the abrasive grains. This ensures excellent grinding/cutting performance from the very start. Depending on the grain size and density and on the hardness of the workpiece to be processed, a high wear resistance can be achieved. Continuous extraction of grinding waste will enhance the durability and service life.

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For this purpose, the term **"hardness"** is mentioned: If a substance can scratch or damage another it is harder than the other. Under this principle the Mohs scale of hardness (Mohs) has been established. The Mohs scale is from 1 to 10 Mohs (diamond) hardness level. To test the hardness we use a number of different tests: Abrasive hardness test device, pencil hardness device and pendulum hardness device.

Roughness:

One of the main surface parameter of a substrate is the roughness (R). This provides information the condition of the surface.
The most common roughness definitions are:

Roughness depth R_t	Arithmetic mean deviation R_a	Average roughness (depth) R_z

Working speed and the grinding tool strongly affect the resultant surface roughness of the workpiece. For example, a grinding disk with P320 grains will leave marks when used by hand. These marks will show also after the application of thin lacquers. The same abrasive medium on a rotating sander and with a minute vertical stroke will produce faster material removal and a fine uniform finish.

Sanding paper is standardized (DIN / ISO) according to "grain" size and bears the letter **P**.

- The series starts at P16 (very coarse) to P1200 (very fine) and to Super Fine (sf). Some manufacturers also use the 'P' standard for products above P1200 up to P4000.
- Likewise, there is a division into wet and dry abrasive paper. Wet sanding is used less and less.
- When sanding is necessary, the information by paint manufacturers should be followed.

Important! When sanding dry old coatings, fillers, etc. it is recommended to initially use grinding disks of less than P100 sanding paper.

Example:

- Putty is sanded with an eccentric grinding machine and P80 paper.
- The preparation paper grade for application of a filler medium should be P220/P240. Changing from P80 to P220 is a difference of 140 (i.e. 40 more than 100) - This step is too large! There should have another sanding step in-between.
- The correct procedure is to prepare 80% of the surface using a P80 grinding disk.
- Continue with P150 to finish the surface for 90%.
- Thereafter use P220 / P240 to complete the surface for 100%.

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Sanding chart with eccentric machine (dry):

Substrate	Cleaning	Sanding	Note
Steel	Thinner / Degreaser	P80 – P180	Surface must be free from oil, grease also rust, mill scale and scale
Galvanized steel	Thinner / alkaline cleaner	P180 – P240 Scotch-brite	Remove oxidations products and other contamination products
Hot dipped galvanized steel	Thinner / alkaline cleaner	P150– P220 Scotch-brite	Remove oxidations products and other contamination products
Aluminum	Thinner / alkaline cleaner	P180 – P240 Scotch-brite	Remove oxidations products and other contamination products
Glass fibre (GFK)	Degreaser	P220 – P280 Scotch-brite	
Putty	Remove dust / Degreaser	P80 – P240	Intermediate sanding step with P150/P180
Surfacer/Primer	Degreaser	P320 – P400	Must be well cured.
Oldcoating	Degreaser	P320 – P400	Must be well cured.