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INSTRUCTIONS for CALIBRATING THE RH ANALYSER PRO

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WHY CALIBRATION IS NECESSARY

The Analyser Pro is a precision instrument, allowing very accurate control of printing exposure and contrast.

However each enlarger, filter set, paper brand, paper type, paper batch, and processing schedule are different.

I have found that not only does each different paper brand and label have its own speed and contrast but different emulsion batches and even different boxes of the same paper often show significant speed differences.

Printing papers are much more sensitive to exposure change than film negative materials. An exposure change of 1/6 stop (about 16%) produces a clearly detectable difference in print density with most papers but this amount would be insignificant when exposing film in a camera.

Therefore, to obtain the most accurate and consistent results precise calibration is essential.

You can save vast amounts of time, money from wasted paper and emotional frustration by calibrating at key points along the path to print perfection.

At first the whole process of making test strips, evaluating these and entering the calibration settings all seems rather mysterious and complicated.

Fear not. With the help of these instructions and a bit of practice your expertise and confidence will improve markedly.

WHEN TO CALIBRATE

1. Before using a particular paper for the first time.

This entails making a full set of seven highlight (speed) and seven dark tone (contrast) test strips.

2. If you change enlarger, colour head, filter set or make a substantial change to your print processing method.

The analyser's default settings are based on Ilford MG1V RC deluxe, with under the lens contrast filters. If you use, as I do, a dichro colour head, all the settings will require recalibration. A VCCE head will need different settings again.

3. When switching to a new emulsion batch of the same paper. In this situation it is generally sufficient to run just the highlight (speed) set of test strips.

The emulsion batch is indicated somewhere on the label usually near the product identification number.

4. The first sheet of a new box of paper even if it bears the same emulsion batch number as the previous box. In this situation I suggest running a single grade 2 test strip at first. If this indicates correct calibration it is usually safe to leave the settings unchanged. However the high and low grades might not be correct and a full highlight (speed) set of test strips might be needed if print exposures in the high or low grades are not quite right.

5. If for some reason you switch to a different analyser unit.

HOW TO CALIBRATE

General principles

We know that variable contrast printing papers have a different contrast at each grade but they also have a significantly different speed.

Therefore we need to calibrate paper speed and contrast at each grade.

To calibrate speed we use a series of incremental exposures, generated by the analyser, to find which exposure produces a *just off white* tone in a test strip. If this is different from the exposure recommended by the default settings then the settings are altered to suit the new conditions.

The new settings are entered and saved in Calibration mode as changes to the exposure **Offsets**. These appear in the display as **OFF** numbers.

Contrast is calibrated in a similar fashion but this time we run test strips to a *just off black* tone. The results are entered in Calibration mode as **ISO(R)** numbers.

You don't need to understand the theory of ISO R numbers. Just regard the ISO(R) at each grade as an arbitrary number which can be adjusted in a systematic way to achieve the desired dark tones in your prints.

There are six basic steps in the process:

1. Make seven "speed" test strips, one at each whole grade setting.
2. Evaluate these in approximately the same lighting level that you expect for viewing the final prints.
3. In Calibration mode, enter corrections to the speed offsets at each grade.
4. Make seven "contrast" test strips, one at each whole grade setting.
5. Evaluate these, in the same light you used for the speed test strips.
6. In Calibration mode, enter corrections to the ISO(R) numbers at each grade.

Getting ready.

Some simple DIY gadgets make the job easier and more accurate.

1. Two test negs in the format you intend to use for calibration. 35mm is the easiest.

The highlight (speed) neg is a photo of a Kodak Grey Card or similar even toned subject in even lighting, exposed at two stops more than the metered reading using f8 or smaller to ensure even density across the frame.

The dark tone (contrast) neg is the same but exposed two stops less than the metered reading.

2. A printing easel. A four bladed type is best.

3. A Test Strip Template Sheet. This is just a sheet of paper the size you want to use for calibration (20x25 cm is convenient) with six evenly spaced lines marked on it in heavy black felt pen so you can easily see them by safelight. (see diagram 1.)

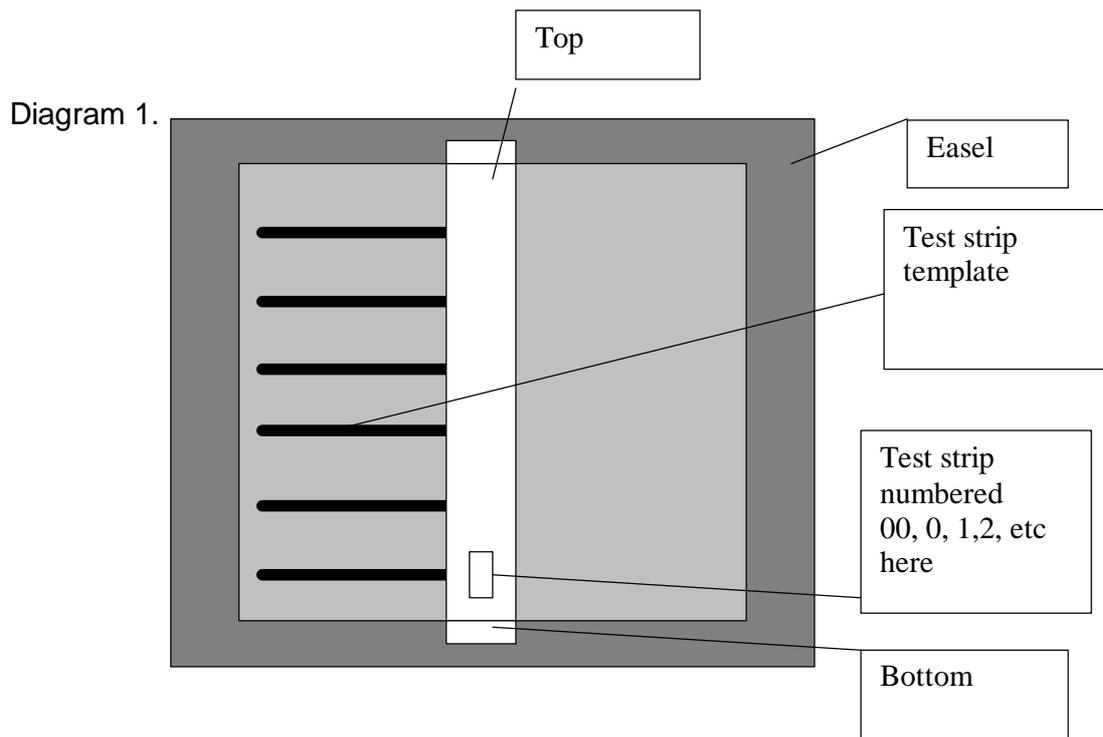
4. Eight strips of the printing paper you are testing. Each needs to be about 3 cm longer than the space between the easel blades to provide a decent section of unexposed paper giving a reference for base paper white.

A width of 2cm is adequate.

Write near one end of each strip with a ball point pen on the emulsion side a number from 00 through 0 and up to 5, with two strips numbered 2.

Put these in a light tight place with one of the number 2 strips on top, then number 00, 0, through to 5 on the bottom.

5. A card slightly larger than the Test Strip Template Sheet (25x30 cm is convenient) and thicker than a sheet of printing paper so no light will penetrate. Let's call this the **cover card**. It is used to cover the test strip in incremental steps.



Enlarger lamp warm up characteristics

Try this little experiment.

Start with a cold enlarger. Insert a negative, set the analyser for 1/12 stop increments and place the metering cell on an even toned area.

Switch on the enlarger lamp and immediately take a meter reading. Note the reading, press **Clear** and without moving the remote sensor at all, immediately take another reading.

Repeatedly take readings for a couple of minutes.

With my enlarger, an LPL7452, the time indicated in seconds decreases over the first few readings then stabilises.

The important thing to note is that before you meter a test strip, the enlarger lamp must be warmed up and delivering consistent readings.

How to make a test strip

Decide which paper set on the Analyser you want to allocate to the printing paper you are about to calibrate.

Briefly press the **Calibration** button repeatedly until the required number is displayed.

The display reads **PAP 1® PAP 2® PAP 3** up to **PAP 8** and back to **PAP 1**.

Select the exposure step size required. I recommend standardising on 1/6 stop for speed test strips and 1/3 stop for contrast test strips.

Press the **Darker** and **Lighter** buttons together. The display indicates the currently set step size.

Press the **Darker** button to increase, and the **Lighter** button to decrease the step size.

Again press the **Darker** and **Lighter** buttons together to memorise the new step size and return to the normal display.

To make a “speed” test strip, follow the sequence below :

⇒ If you are calibrating a new paper, start with grade 2. This will give you a quick check whether the default offsets give meaningful test strips. If the initial grade 2 strip does not give a “just off white” tone somewhere (all the tones are too light or too dark) then you will need to enter a rough correction to all the offsets from grade 00 to 5 then repeat the grade 2 strip until you get a “just off white” tone more or less in the mid section of the strip.

With an unusual or completely unknown paper try making an initial grade 2 test strip using a 1/2 stop step size.

In the sequence below, the little ® symbol indicates that it is vital to remember this step as the Analyser will not tell you if you forget and the consequence of forgetting is incorrect results.

- ♣ ® Check PAP set.
 - ♣ ® Check the step size is 1/6 stop.
 - ♣ ® Ensure the filter grade is same as grade set on Analyser.
 - ♣ Place test strip template in the easel as in Diagram 1.
 - ♣ ® Remove filters from the light path for metering. This applies to under the lens or dichroic colour head filters.
 - ♣ Insert the darker of the two calibration negs in the enlarger and focus on the grain.
 - ♣ Press the **Focus** button to switch on the enlarger lamp.
 - ♣ Place the remote sensor approximately in the centre of the frame and press the **Measure** button.
- Note the time indicated on the display.
- Press the **Clear** button after each trial measurement to clear the display.
- Adjust the lens aperture and re measure until a time of about 20 seconds is displayed. The exact time is immaterial.
- ♣ Re measure until the readout is constant.
 - ♣ With the enlarger lamp **on** press the **print** button to enter test strip mode. The enlarger lamp goes off and the display reads **test** then **6 th** then **t** plus the time in seconds of the first exposure of the test strip sequence.
 - ♣ ® Insert the filters into the light path.
 - ♣ Put a strip of printing paper in the easel sitting just to one side of the lines on the test strip template, as in Diagram 1. Place the grade number at the bottom.

(Actually it doesn't matter which way the test strip goes or where the numbers are placed. The important thing is to establish a set routine so the process goes smoothly without errors. The method described here works well for me.)

- ♣ Press the **Print** button. The Analyser will deliver the first of seven timed exposures.
- ♣ Cover the test strip up to the first dark line (nearest the bottom) on the test strip template with the cover card.
- ♣ Press the **Print** button again. The Analyser will deliver the second timed exposure.
- ♣ Keep moving the cover card up one step and press the print button each time. At the end of each of these short exposures the display briefly reads **End**.
- ♣ After the seventh exposure the display briefly flashes **End** twice.
- ♣ Develop, fix and briefly wash the strip of film. Dry quickly with a hair dryer.

How to evaluate the test strip

Diagram 2A illustrates the test strip which a correctly calibrated Analyser would produce. The 4th step up from the bottom is *just off white*.

In diagram 2B the 6th step from the bottom is *just off white*.

This is a little underexposed so the **OFF** setting for that grade needs to be increased by two increments each of $1/6 = 2/12$ stop. That is a total of $4/12$ or plus 4.

In diagram 2C the second step from the bottom is *just off white*.

This is a little overexposed so the **OFF** setting needs to be decreased by $4/12$. This is entered as a minus 4 correction.

Diagram 2D illustrates a test strip with no *just off white* tone anywhere. It looks like the strip is overexposed by about $8/12$ of a stop.

The procedure here is to enter a minus 8 correction in the **OFF** setting for that grade and re – run the test strip.

If this is the preliminary grade 2 test strip of a new paper, enter minus 8 for all grades. This should ensure that each of the seven test strips has a just off white tone somewhere on the scale.

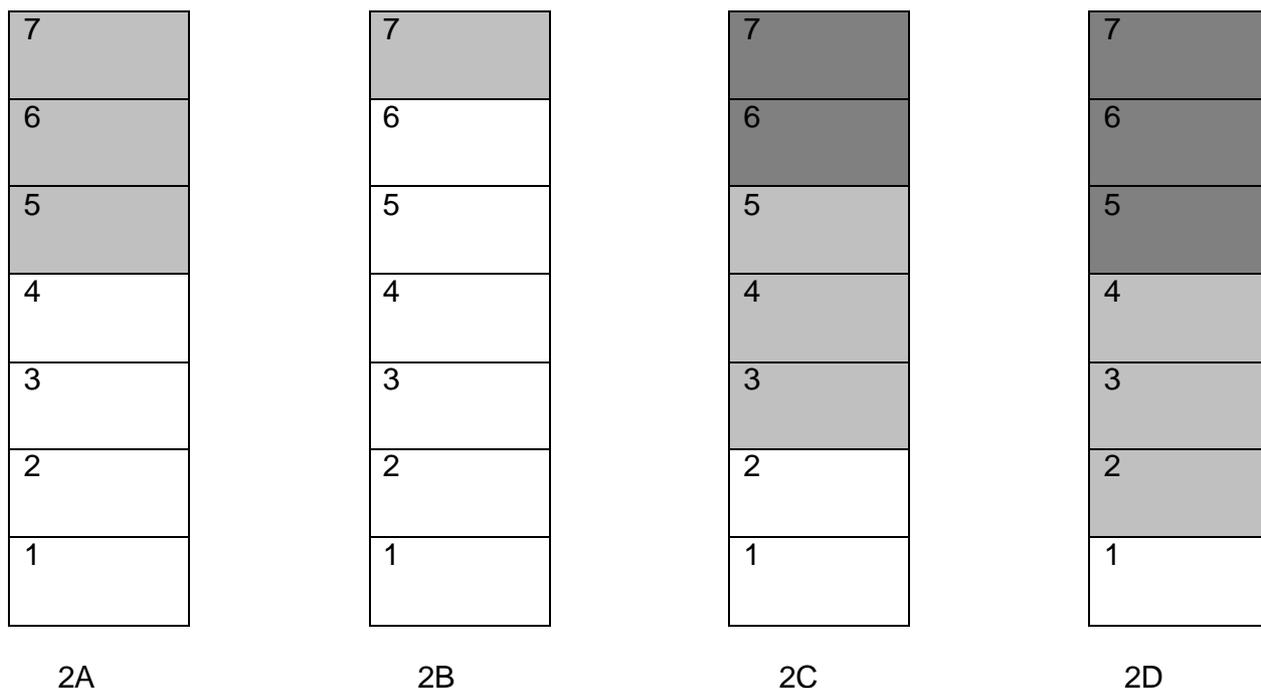
Note: If you are using a dichro colour head the correct offsets for grades 4 and 5 will be about 10 to 15 less than the average offset for grades 00 to 3.

So in the example above you would set minus 8 for grades 00 through to 3 and minus 20 for grades 4 and 5.

Note also that a true grade 5 is not achievable with dichro colour heads. Zero Y,180 M produces slightly less than grade 4.5.

It is quite satisfactory to calibrate this as grade 5 so long as you realise it is actually only about grade 4.4.

Diagram 2.



How to enter OFF corrections

1. Decide and write down somewhere prominent, preferably attached to the Analyser, which **PAP** number you have assigned to which paper.
2. Press and hold the **Calibration** button for about two seconds. The Analyser now enters calibration mode.

The display reads **CAL** then **PAP** (whatever is set, number 1 to 8) then **OFF** then the grade number plus a two digit number which is the offset for that grade.

To change the **PAP** set press the **Calibration** button briefly. You can do this anytime.

3. Select the grade to be calibrated by pressing the **Harder** or **Softer** buttons. Note that in calibration mode you can only select whole grades.
4. Enter offset corrections by pressing the **Darker** (to increase) or **Lighter** (to decrease) buttons. Note that in calibration mode an offset of plus or minus one is equivalent to 1/12 stop.

Offset adjustments can only be made in 1/12 stop increments.

For a test strip like Diagram 2B, press the **Darker** button four times. This will increase the offset by plus 4 from its previous setting.

If the test strip is like Diagram 2C, press the **Lighter** button four times. This will decrease the offset by four units. If the previous offset was, say, minus 2, the new offset will be minus 6.

5. **To exit calibration mode** press the **Focus** button.

Pressing this button once enters the contrast calibration programme. We will come to this shortly.

For now, press the **Focus** button twice to exit calibration mode and save the offsets you have entered.

ATTENTION !! After exiting calibration mode, the Analyser reverts to the default settings for paper set and step size. The factory settings are PAP 1 and 1/12 stop. This means that if you enter offsets for (say) PAP 3 then want to proceed with contrast test strips for the same paper it will be necessary to reset the PAP number and step size.

Making a full set of seven test strips

Starting with grade 00 and following the instructions above, make a test strip at each grade through to 5.

Temporarily store the exposed strips in a light tight place separate from the unexposed strips.

Process all seven strips together, ensuring constant agitation and making sure they don't stick together.

When dry, evaluate each strip and enter the new offsets in calibration mode.

Very important: Make a hard copy of these offsets. This has the same logic as backing up work you do on a computer.

How to make contrast test strips

It is essential to enter a full set of correct speed offsets before starting to calibrate contrast.

The basic procedure for making contrast test strips is similar to that for speed with some important differences.

When we were making speed test strips the far left hand LED glowed when we took a meter reading. In fact the Analyser computed a reading such that had we pressed the **Lighter** button once after metering, the LED would start flashing.

For the contrast strips we need to press the **Measure** button to take a meter reading, then repeatedly press the **Darker** button. This moves the glowing LED across to the right.

We need to bring the LED to the far right position such that it glows steadily but one further press of the **Darker** button will make it start flashing.

This requires some adjustment of the lens aperture and two or three trial meter readings until the exposure time comes to about 20 seconds.

Press the **Clear** button after each trial reading to clear the display.

As you progress from the softer to the harder grades the lens needs to be stopped down progressively.

So here is the full sequence:

- ♣ ⑥ Check PAP set.
- ♣ ⑥ Check step size is 1/3 stop.
- ♣ ⑥ Check filter grade is the same as the grade set on the Analyser.
- ♣ Place test strip template in the easel as in Diagram 1.
- ♣ ⑥ Remove filters from the light path for metering.
- ♣ Insert the lighter of the two calibration negs in the enlarger and focus on the grain.
- ♣ Press the **Focus** button to switch on the enlarger lamp.
- ♣ Ensure the enlarger lamp is warmed up.
- ♣ Place the remote sensor approximately in the centre of the frame and press the **Measure** button. One of the LED's will light up and a time will be displayed.
- ♣ Press and hold or repeatedly press the **Darker** button until the glowing LED occupies the far right position and one further press of the button will make the LED start flashing.
- ♣ With the enlarger lamp **on** press the **Print** button to enter test strip mode.
- ♣ ⑥ Insert the filters into the light path.
- ♣ Insert a strip of printing paper in the easel.
- ♣ Press the **Print** button for the first test strip exposure.
- ♣ Make the next six exposures just as you did for the speed test strips.
- ♣ Develop, fix, rinse and dry the exposed paper strip.

As for the speed test strips, when calibrating contrast on a new or unknown paper, start with a trial at grade 2 and repeat if necessary. Then if necessary, make fairly gross adjustment to all the ISO(R) numbers to ensure the *just off black* segment of each of the seven strips is more or less in the middle.

Make a set of seven contrast test strips from grade 00 to 5 inclusive. As with the speed test strips store all the exposed strips in a separate light tight place and develop them all together.

How to evaluate contrast test strips

Diagram 3A illustrates a contrast strip from a correctly calibrated Analyser.

You can (I hope) see that the 4th step up from the bottom is *just off black*.

Estimating *just off black* is more difficult than *just off white*. This is why I recommend the larger step size of 1/3 stop for contrast test strips.

Diagram 3B illustrates a test strip made with an ISO(R) number which is too low for the grade used.

Diagram 3C shows a test strip made with an ISO(R) number which is too high for the grade used.

Each increment on the test strips represents 1/3 stop.

Each stop is equivalent to 30 ISO(R) units. So each 1/3 stop increment is equivalent to 10 ISO(R) units.

I find the following little rule helpful;

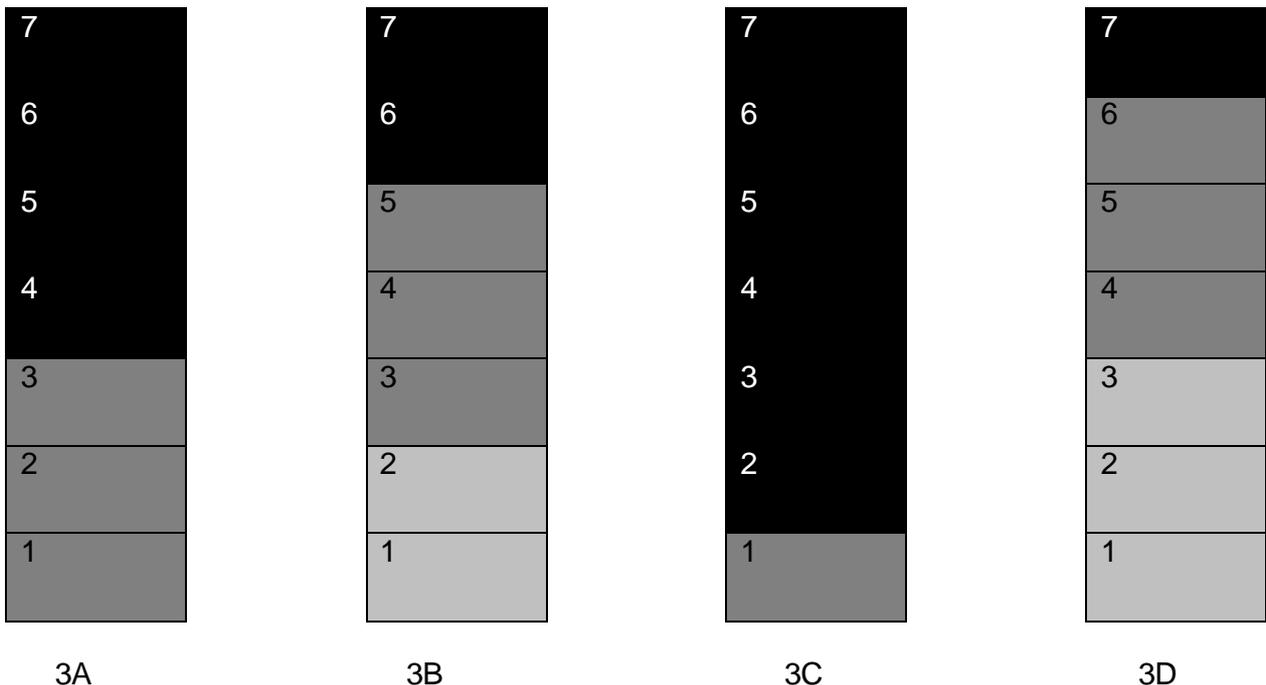
“ If the 4th step (The middle one) is too light, increase the ISO(R) setting.
If the 4th step is too dark, decrease the ISO(R) setting.”

In Diagram 3B we can see that the 6th step is *just off black*. To correct the ISO(R) setting increase by 2 steps x 10 units = 20 units.

In Diagram 3C the 2nd step is *just off black*. In this case we need to decrease the ISO(R) number at that grade by 2 steps x 10 units = 20 units. So we need to enter minus 20 units.

In Diagram 3D a clear *just off black* step cannot be identified. It looks like *just off black* might be about 4 steps up from the 4th step which is too light. In this situation enter 4 x 10 = plus 40 ISO(R) units and re run the test strip.

Diagram 3.



How to enter contrast adjustments

1. Press the **Calibration** button for about 2 seconds. This enters calibration mode at the speed offset sequence.

2. Now press the **Focus** button to enter the contrast calibration sequence.

The display reads **cont** (contrast) then a grade number and the ISO(R) number.

3. Press **Harder** to increase and **Softer** to decrease grade.

4. Press **Darker** to increase and **Lighter** to decrease the ISO(R) number.

5. Enter the ISO(R) corrections at each grade.

6. Press the **Focus** button again to exit calibration mode and save the new entries.

Saving your data to hard copy

I strongly recommend setting up a little A5 size template like Diagram 4 in your word processing programme to store your calibration data. You can print this off for each paper in use and store the printout with the analyser instructions.

This example shows fairly typical numbers achieved with a popular FB paper using a dichro colour head and Ilford recommended Y and M settings for supposedly constant exposure across the grades.

Diagram 4.

RH ANALYSER CALIBRATION SETTINGS

PAP NUMBER 3

PAPER Agfa MCC.111
SIZE 305x406

Emulsion # 700021C

Grade	OFF	ISO R
00	-1	235
0	-2	175
1	-1	155
2	+1	119
3	+1	96
4	-10	82
4.5	-19	75