Minimum Local F-Numbers

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The owner always wants to know what kind of a floor he got for his money. Usually, he wants an overall view for the whole job, plus some idea of how good the individual slabs were.

"Overall F-Numbers" are the F-Numbers that represent the flatness and levelness of the entire job. ("Overall") Using the Face Company's software, you get these F-Numbers from the Project Summary, at the "Surface" (Top) level of the Job. These are the F-Numbers for the entire portion of the job that has a single specification. This is exactly what ASTM E-1155 calls for in paragraph 9.15 of the test method.

The overall F-Numbers are an area-weighted average of all the Combined Section F-Numbers. If the job is specified to be FF 25/FL 20, and the measured F-Numbers turn out to be exactly FF25/FL 20, that does not mean that every square foot of the floor is FF25/FL 20. So if the floor contractor actually achieves exactly a FF 25/FL 20 floor, you and I and the owner all understand that some parts of the floor will be better than FF25/FL 20, and some parts of the floor are worse than FF25/FL 20. The owner is happy with all the parts of the floor that are better, but he wants to limit how bad the worst parts can be. For example, if the best part of the floor was FF 26/FL 21, and the worst part of the floor was FF 24/FL 19, the owner would be perfectly happy. But if the floor had some extremely good parts - say, FF 40/FL 35, and had some very bad spots, say, FF 10/FL 5, the floor might still have an overall value of FF25/FL 20, but the owner wouldn't be happy about it. He would love the good parts, but he couldn't use the part of the floor that is FF 10/FL 5. So he sets a "Minimum Local" F-Number specification to limit how bad the floor can be in any small area of the floor. The method for computing F_F-Numbers for a Test Section is given in paragraph 9.11 of ASTM E-1155, and the method for calculating F_L-Numbers for a Test Section is given in paragraph 9.12.

OK, you say, I can follow that, but what exactly is a "Minimum Local" area? What do you mean by "any small area of the floor?" There are several ways to answer this question. The best way is for the owner to define it in the contract. The specification should describe what is meant by a "Section" or "Minimum Local Area". A Section (Minimum Local Area) may be conveniently designated by column lines and half-column lines, if the project uses columns. If not, then the specification should describe the intended area of Sections. "The Minimum Local area shall be the total area of any floor slab that does not exceed XXXX square feet", or in the case of large floor slabs, "The Minimum Local area shall be any bay defined by column lines." Or if the columns are very far apart, you could say "The Minimum Local area shall be defined as that part of a floor slab bounded by column lines in one direction, and half-column lines in the other direction." The number of Sections you need to have depends on the number of pours and the size of the pours. If the contract specifications do not say what size a "Test Section" is, then you have some flexibility in designating Test sections.

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ASTM E 1155 does not allow you to measure across construction joints, so the largest Test Section you can measure is a single slab or pour. If the pour is small, the whole pour itself can be the Test Section. However, if the pour is quite large, you should consider subdividing the pour into several smaller Test Sections. Where the structure is supported by columns, you may divide the pour along column lines. For example, if the columns are 40 ft apart in one direction and 32 ft apart in the other direction, you could say that each Test section is a 40 X 32 ft bay. If the columns are spaced quite far apart in one direction, you divide the Sections by column lines in one direction and half-column lines in the other direction. For example, if the columns are 60 ft apart in one direction and 48 ft apart in the other direction, you could say that each Test section is half a bay, 48 X 30 ft. The main reason for subdividing the large slabs into several Test Sections for "Minimum Local F-Number" reporting purposes is to identify the portion of the slab that is bad, rather than assuming that the whole slab is bad. By subdividing very large slabs into smaller areas, we can get the F-Numbers for smaller parts of a large slab. If all the F-Numbers for all the Test sections are good, fine. If one of the smaller Sections fails, then we have identified the "bad" portion of the slab for the owner and contractor. Incidentally, breaking a large slab into two or more Sections does not affect the F-Numbers for the slab. They are what they are, and if the two or more subordinate parts were to be correctly combined together, the F-Number for the whole slab would still be correct. (In other words, breaking the slab down into two or more parts doesn't make the F-Numbers worse, or better.)

It is important to note that Minimum Local F-Numbers should NOT be ascribed to individual Runs. Minimum Local F-Numbers are the F-Numbers for a Test Section. Again, what constitutes a "Test Section" should be spelled out in the contract.

You might also ask "How should I decide what "Minimum Local" F-Number specification to use? Obviously, it needs to be lower than the overall specification. If it is too low, it won't prevent the contractor from making a floor that has some really bad spots on it. On the other hand, if it is too high, it will not be practical. You just can't expect that the entire slab will be exactly the same. The Face Company recommends using 2/3 of the overall specified F-Numbers. This limits how bad any Test Section can be, but it allows for a reasonable amount of variation in the whole Job.

The Dipstick software provides a report at the top level called the "Project Summary" which gives the measured overall F-Numbers and the specified overall F-Numbers. You can **compare the specified overall F-Numbers to the measured FF and FL at the top of the Project Summary.** This same report also shows the Combined section F-Numbers for each of its Test Sections. You can also **compare each of the Sections' measured F-Numbers to the Minimum Local F-Numbers**. The software also provides a detailed report for each Section that is called a "Combined section Report." This report shows the measured F-Numbers for this particular test section and the F-Numbers for each of the Runs that belong to it. This information is basically informational, since the Project Summary provides both the measured overall and measured Combined section (minimum local) F-Numbers.