

Performance of Amalgam mixing devices

Cavex is manufacturer of amalgams for many decades, delivering amalgam in many different packaging forms to our customers worldwide. Today, we notice a growing market for the use of pre-dosed capsules. Most important reasons are the convenience of having a controlled dosage in every situation and the hygienic aspect when working with mercury.

Through the years many improvements in the pre-dosed capsules have been introduced followed by the latest improvement: the complete new development of the self-activating capsule. During the introduction of this new capsule, we receive questions regarding the amalgam mixing devices in the market. Can Cavex advice on the suitability of amalgam mixing devices?

To answer this question we performed extended research on the mixing quality of several brands of capsules in different amalgam mixing devices. We compared these results with the information found in the scientific literature available on this subject. Basically, there are two parameters indicating the mixing performance of the capsule in the amalgam mixing device.

1. Power Rating (P)

The power rating is depending on the ratio between frequency and amplitude of the amalgamator. It can be calculated as follows:

$$P = (\text{Frequency in Hz})^3 \times (\text{Amplitude in m})^2$$

$$P = < 30 \text{ low power}$$

$$P = 30 - 100 \text{ medium power}$$

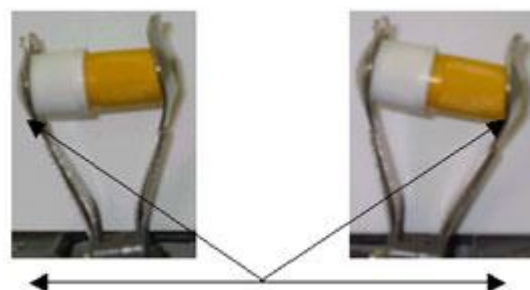
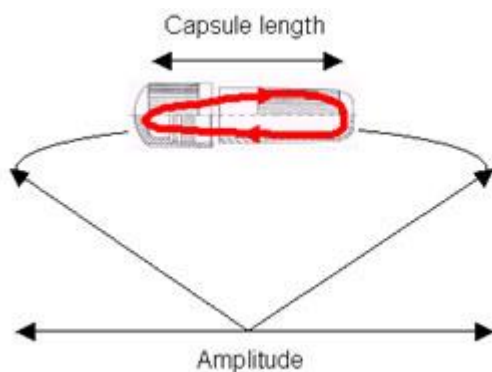
$$P = > 100 \text{ high power}$$

2. Efficiency (E)

The Efficiency is depending on the capsule internal length and the amplitude of the amalgamator. It can be calculated as follows:

$$E = \frac{\text{Capsule internal length in mm}}{\text{Amplitude in mm}}$$

The most efficient amalgamation is obtained for a length : amplitude ratio between 0.5 and 1.3.



In the following table we have calculated the Power Rating and Efficiency for several amalgam mixing devices, using the internal length of the new Cavex Amalgam capsule of 29 mm:

Amalgamator	Frequency (rpm)	Frequency (Hz)	Amplitude (mm)	Capsule length (mm)	Power Rating	Efficiency>
Silamat		75	25	29	264	1,2
Capmix	4450	74.2	25	29	255	1,2
Rotomix	2850	47.5	60	29	386	0,5
Optimix	3000 - 4800	50 - 80	25	29	78	1,2
Ventura		66.7	25	29	185	1,2
Tac 400	4000	75	25	29	264	1,2
Duomat	4500	66.7	28	29	233	1.0
>HL-AH (China)	4000 - 3000 - 2500	50 - 41.7	9	29	10 - 6	3,5

Based upon these theoretical data and together with actual test results with Cavex amalgam capsules, we defined the optimum mixing times in different amalgam mixing devices as follows:

Amalgamator	Manufacturer	NonGamma 2	Octight	Avalloy
Silamat (4000rpm)	Vivadent	6	6	7
Capmix	3M/Espe	6	>6	6
Rotomix	3M/Espe	5	7	7
Optimix (4000rpm)	Kerr	6	6	7
Ventura	Madespa	6	6	7
Tac 400	Linea Tac	6	6	8
Duomat (4000rpm)	Degussa	7	8	n.a.
HL-AH (China)	H.Z.S.I.	n.a.	n.a.	

Conclusion

The Silamat, Capmix, Optimix, Ventura and Tac 400 amalgam mixing devices have a high Power Rating combined with high Efficiency. These are perfectly suitable for mixing the Cavex Amalgam capsules. For the Rotomix we find a high Power Rating but a low Efficiency. This is caused by the large Amplitude and the rotating movement of this device. For the optimum amalgamation longer mixing times are necessary. However, this will result in very warm amalgam and fragmentation of the mercury pillow. The Efficiency found for the Duomat is 1.0, which is little only less than 1.2. As a result slightly longer mixing times are necessary. The HL-AH from Hangzhou Zhongrun Systems, China has low Power Rating and low Efficiency. As a result we cannot recommend this type of amalgam mixing device for the Cavex amalgam capsules. For further questions about this subject or other types/brands of amalgam mixing devices, please do not hesitate to contact us.