

TORQUE GUIDELINES FOR CAPPING BOTTLES

Definition: Torque is rotational force applied during application or removal of a closure from a bottle.

A. Application Torque: The rotational force with which a closure is applied to a bottle finish during capping. It affects seal integrity and tightness between bottle and closure. Properly established application torque will provide sealing integrity under expected conditions or temperatures, humidity and shock.

B. Removal Torque: The rotational force with which a threaded closure is removed or unscrewed from a bottle finish. It defines the amount of rotational force necessary to loosen, open, or remove the closure. A properly designed package should have a removal torque range appropriate for its intended use and the consideration of any requirements for child resistant or tamper evident closure needs.

C. Stripping Torque: The application torque which is sufficient to cause the closure and/or bottle finish to distort and override the matching closure/bottle threads, resulting in loose caps, no seal, or package component deformation.

D. Torque Values: Torque is defined in inch-pounds or Newton-meters and is measured by various types of torque meters. Specific methods for performing torque tests are defined in Technical Bulletin PBI No. 7. The optimum relationship between applied and removal torques and good sealing characteristics under various physical and environmental conditions must be established for each individual package. Application torque requirements also vary according to the closure size being used.

The following torque values are listed for use as guidelines only and are to be used for closure application by hand under controlled conditions. Special conditions may require torque values other than those listed.

<u>Neck Finish Identity</u>	<u>App. Torque (inch-pounds)</u>
8	3-7
10	4-8
13	5-9
15	5-9
18	7-10
20	8-12
22	9-14
24	10-18
28	12-21
30	13-23
33	15-25
38	17-26
43	17-27
48	19-30
53	21-36
58	23-40
63	25-43
66	26-45
70	28-50
83	32-60
86	40-65
89	40-70
100	45-70
110	45-70

NOTE: Immediate removal torque values are approximately 40-80% of hand application torque values. Production capping equipment should be adjusted to produce similar immediate removal torque values.

* These are generally accepted application torques. Specific closures may require specific application torques which differ from those listed above.