

Below is an extract from AS3569-2010 Steel Wire Ropes

AS 3569—2010

30

4.3.3 Minimum breaking force factor (K)

The minimum breaking force factor (K) is an empirical factor used in the determination of minimum breaking force of a rope and obtained from the product of fill factor (f) for the rope class or construction, spinning loss factor (k) for the rope class or construction and the constant $\pi/4$, as follows:

$$\text{This may be expressed as: } K = \frac{\pi f k}{4}$$

NOTE: K factors for the more common rope classes and constructions are given in Tables C1 to C17 of Appendix C.

4.3.4 Minimum breaking force (F_{\min})

The minimum breaking force (F_{\min}) is a specified value, expressed in kilonewtons, below which the measured breaking force (F_m) is not allowed to fall in a prescribed breaking force test and which is normally obtained by calculation from the product of the square of the nominal rope diameter (d), the rope grade (R_r) and the breaking force factor (K), as follows:

$$F_{\min} = \frac{d^2 R_r K}{1000}$$

4.3.5 Rope grade (R_r)

Rope grade (R_r) denotes a level of requirement of breaking force, which is designated by a number (e.g. 1770, 1960).

NOTE: It does not imply that the actual tensile strength grades of the wires in the rope are necessarily of this grade.

4.3.6 Calculated minimum breaking force ($F_{c,\min}$)

The calculated minimum breaking force, ($F_{c,\min}$) is based on the nominal wire sizes, wire tensile strength grades and spinning loss factor for the rope class or construction as given in the manufacturer's rope design.

4.3.7 Measured breaking force (F_m)

The measured breaking force (F_m) is obtained using a prescribed method.

NOTE: Breaking force testing requirements are specified in Section 6.

4.3.8 Measured aggregate breaking force ($F_{c,m}$)

The measured aggregate breaking force ($F_{c,m}$) is the sum of the measured breaking forces of all the individual wires taken from the rope.

4.3.9 Spinning loss factor (k)

The spinning loss factor (k) is the ratio between either the calculated minimum aggregate breaking force ($F_{c,c,\min}$) and the calculated minimum breaking force ($F_{c,\min}$) of the rope or the specified minimum aggregate breaking force ($F_{c,\min}$) and the specified minimum breaking force (F_{\min}) of the rope, as determined from the rope maker's design.

4.3.10 Calculated minimum aggregate breaking force ($F_{c,c,\min}$)

The calculated minimum aggregate breaking force ($F_{c,c,\min}$) is calculated from the sum of the products of cross-sectional area (based on nominal wire diameter) and tensile strength grade of each wire in the rope, as given in the manufacturer's rope design.

The equation in clause 4.3.4 shows a direct relationship between Minimum Breaking Force (F_{\min}) and the Minimum Breaking Force Factor (K).

$$F_{\min} = \frac{d^2 R_r K}{1000}$$

The Minimum Breaking Force factor (K) is directly related to the fill factor (f) as per the equation in clause 4.3.3.

$$K = \frac{\pi f k}{4}$$

Re-arranging the equation for Minimum Breaking Force

$$F_{\min} = \frac{d^2 R_r \pi f k}{4}$$