Allowable stress

Stress and its limit values:
Reliable use of the products depends on how the designer ensures that the maximum stress in their critical locations is less than its limit value. This inequality must be met with sufficient margin to cover all sources of uncertainty of the relevant quantities; Under these circumstances, violation may occur only in exceptional circumstances.
See Equations. below include sources of uncertainty regarding the strength of the component.

Safety factor:
Determination of the corresponding coefficient of safety is a complicated and responsible task. A high coefficient of safety usually results in a safer design, however with a higher weight and thus a higher price and vice versa. It is the basic engineering compromise of "price vs. safety". However, it is the responsibility of the designer to determine such coefficient of safety that ensures corresponding safety at an acceptable price. At the same time, the coefficient of safety can vary within a wide range 1,1 to 5+.

Coefficient according to load:

load	[]
Static load	1
Unidirectional load, non-impact load	0,8
Unidirectional load, with a small impact load	0,7
Unidirectional load, with a big impact load	0,6
Alternating load, with a small impact load	0,45
Alternating load, with a big impact load	0,25

Allowable axial stress:

$$\sigma_{Aall} = \frac{0{,}45 R_{p0{,}2T}}{S_F} * C_c$$

σ_{Aall}	allowable axial stress	[MPa]
$R_{p0,2T}$	the minimum yield strength or 0,2% proof strength at calculation temperature	[MPa]
S_F	safety factor	[]
C_c	coefficient according to load	[]

Allowable bending stress:

$$\sigma_{Ball} = \frac{0{,}6 R_{p0{,}2T}}{S_F} * C_c$$

σ_{Ball}	allowable bending stress	[MPa]
$R_{p0,2T}$	the minimum yield strength or 0,2% proof strength at calculation temperature	[MPa]
S_F	safety factor	[]
C_c	coefficient according to load	[]

Allowable shear stress:

$$\tau_{all} = \frac{0{,}4R_{p0,2T}}{S_F} * C_c$$

τ_{all}	allowable shear stress	[MPa]
$R_{p0,2T}$	the minimum yield strength or 0,2% proof strength at calculation temperature	[MPa]
S_F	safety factor	[]
C_c	coefficient according to load	[]

Allowable bearing stress:

$$\sigma_{all} = \frac{0{,}9R_{p0,2T}}{S_F} * C_c$$

σ_{all}	allowable bearing stress	[MPa]
$R_{p0,2T}$	the minimum yield strength or 0,2% proof strength at calculation temperature	[MPa]
S_F	safety factor	[]
C_c	coefficient according to load	[]

Allowable combined stress:

$$\sigma_{Call} = \frac{R_{p0,2T}}{S_F} * C_c$$

σ_{Call}	allowable combined stress	[MPa]
$R_{p0,2T}$	the minimum yield strength or 0,2% proof strength at calculation temperature	[MPa]
S_F	safety factor	[]
C_c	coefficient according to load	[]

Literature:

AISC: Specification for structural steel buildings: Allowable Stress design and plastic design 1989

Joseph E. Shigley, Charles R. Mischke, Richard G. Budynas: Konstruování strojních součástí 2010.