

Working load limit (WLL), safe working load (SWL) and minimum and maximum rated loads explained

The term *safe working load*, (SWL) was the cornerstone of engineering, particularly with regard to load carrying equipment, for many years.

It was generally considered to be the breaking *load* of a component divided by an appropriate *factor of safety* giving a ‘safe’ load that could be lifted or be carried¹.

About 20 years ago, however, the USA ceased using this term, because of legal implications. The European and ISO Standards followed suit a few years later. However, while this was a clean-cut move, for some time there has been indecision as to exactly what replacement terms could be used.

Over the past two or three years, both the Americans and Europeans have agreed that *working load limit* (WLL) should replace *safe working load* (SWL) in describing the capacity of items such as hooks, slings and shackles etc.

A general definition of WLL was:

the maximum mass or force which a product is authorized to support in general service when the pull is applied in-line, unless noted otherwise, with respect to the centreline of the product
i.e. the WLL of a component is specified by the manufacturer.

However, while the definition for *working load limit* was originally confined exclusively to the manufacturer’s specified maximum load that the item could lift, it is now generally extended to include both of the following:

- the maximum load that an item can lift;
- the maximum load that an item can lift in a particular configuration or application.

If the WLL is thought of as an assessment of the maximum load an item could lift under ideal conditions, the SWL (if the term is going to be used) can now best be thought of as being a derating of WLL, following an assessment by a competent person of the maximum load the item can sustain under the conditions in which the item is being used.

Example:

If a 3 tonne (t) sling hook is attached to the bottom end of a 3 t single-leg wire rope or chain sling in a general use application, it retains its inherent WLL of 3 t. This is its maximum load.

However, if a two-leg sling consists of two such legs, the WLL for the sling hook in such a configuration is $(1.73 \times 3 \text{ t}) / 2 = 2.6 \text{ t}$.

If the hook is to be used in a non-general application (e.g. in a mine shaft or in a hazardous situation such as a hot environment), it may be derated further. Its SWL (as determined by the competent person) in this particular application will be less than the original WLL of 3 t.

Some British (BS), European (EN) and International Standards (ISO) for personal protection against falls from a height have introduced the terms *maximum rated load* and *minimum rated load* into revisions of standards and into new standards. The maximum rated load equates to the WLL. Some components require both the minimum and maximum rated load to be marked on

¹ In the UK the Construction Lifting Operations Regulations 1961 defined it such that it actually became the load which could legally be lifted.

the product. The minimum rated load is required where the performance of a component is affected by a low mass. An example of a product where both a high mass and a low mass can affect performance is a descending device.

The definitions of minimum and maximum rated load used in current drafts of European and ISO Standards are as follows:

minimum rated load

minimum mass in kilograms of personnel, including tools and equipment, to be used with the (*insert product type*), as specified by the manufacturer;

maximum rated load

maximum mass in kilograms of personnel, including tools and equipment, to be used with the (*insert product type*), as specified by the manufacturer.