

INFORMATION ON THE USE OF DATA SHEETS 01.06.

1. Data Items of the 01.06 series deal with the bending of sections beyond the limit of proportionality. Two types of section are considered, namely flanged and circular, and the effect of direct load on the maximum permissible bending moment is shown. The 0.5 per cent proof stress has been taken to be the maximum permissible stress level, although for convenience the form factor (see below) has been related to the 0.2 per cent proof stress.

2. The form factor K is defined by

$$M_{max} = K f_p Z$$

where Z = section modulus

and f_p = 0.2 per cent proof stress of the material.

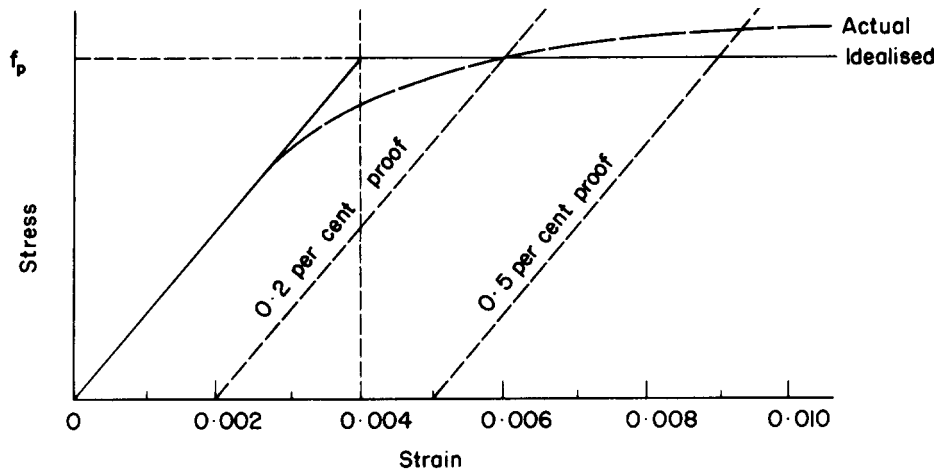
3. The form factors presented in Data Item Nos 01.06.01 to 03 may be used as a guide to the permissible bending moment of flanged sections and circular tubes of ductile materials. Because of the approximate nature of theories on bending beyond the limit of proportionality, the presentation of form factors for a number of specific materials has not been thought to be justifiable. For most steels and aluminium alloys now in use the form factors calculated from their actual stress-strain curves will not vary from the values presented in these data sheets by more than 5 per cent.

For symmetrical sections the presence of axial loading, in addition to bending, reduces the permissible bending moment. An estimate of the effect of axial load on the permissible bending moment in symmetrical flanged sections and circular tubes may be made by use of the appropriate curves on Data Item Nos 01.06.01 and 02.

For non-symmetrical sections, such as Tees and channels, the permissible bending moment is reduced by the application of axial load when that load acts so as to cause failure of the outstanding leg. An estimate of the effect of an axial load acting in this sense on the permissible bending moment of Tee- and channel-sections may be made by use of the curves on Data Item No. 01.06.03. When the axial load acts in the opposite sense the form factors would be slightly higher than those shown on Data Item No. 01.06.03. The amount of the increase depends upon the extent to which the sections are not symmetrical and in highly non-symmetric sections, the end load may *increase* the permissible bending moment that can be carried.

When the axial loading is *tensile* the data sheets give a conservative estimate of the ultimate load for the cross section. Better results can be obtained by using the tensile strength instead of f_p where there is still compressive stress at some point in the cross section. If the stress is everywhere tensile this procedure may lead to optimistic results.

4. The idealised stress-strain curve used in the calculation of the form factors is shown in Sketch 4.1



Sketch 4.1

Up to the 0.2 per cent proof stress, the stress is taken to be proportional to strain and thereafter the stress is assumed constant at the 0.2 per cent proof value. Practical values of K will depend to a slight extent on f_p/E (where E = Young's modulus). The present data sheets have been calculated for $f_p/E = 0.004$. The idealised stress-strain curve is assumed to apply to both tension and compression. It is also assumed that plane sections remain plane and at right angles to the longitudinal fibres of the beam.

5. At 75 per cent of the loads indicated by these data sheets the 0.2 per cent proof stress is nowhere exceeded.