

**Zeitschrift:** IABSE congress report = Rapport du congrès AIPC = IVBH  
Kongressbericht

**Band:** 5 (1956)

**Artikel:** The safety of prestressed concrete as affected by creep and fatigue:  
discussion

**Autor:** Harris, A.J.

**DOI:** <https://doi.org/10.5169/seals-6132>

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## V 8

### The safety of prestressed concrete as affected by creep and fatigue

*Discussion*

### Die Sicherheit beim vorgespannten Beton unter Berücksichtigung des Kriechens und der Materialermüdung

*Diskussion*

### Efeito da fluência e da fadiga sobre a segurança das estruturas de betão preeforçado

*Discussão*

### Influence du fluage et de la fatigue sur la sécurité du béton précontraint

*Discussion*

A. J. HARRIS

B. Sc (Eng.) M. I. C. E.

Consulting Engineer

London

Professor Freudenthal's remarks on the safety of prestressed concrete as affected by creep and fatigue are of a speculative nature.

Now speculation is of value in inverse proportion to the number of facts available.

It so happens that there is a large body of experimental facts concerning creep of concrete, cracking load and fatigue strength of concrete beams in existence; these facts have been built up continuously over the last 30 years and more. Speculation on these subjects which takes no account of these facts is impermissible.

In particular, Professor Freudenthal suggests that a prestress of more than 0.25 fc will result in loss of security against cracking. It is common practice to prestress to much higher stress values than this; if Professor Freudenthal believes that such stress values are harmful to security against cracking he must prove it, either by quoting tests which have already been carried out (and we have noted that there are many such) or by arranging tests himself.

The divergence between fact and speculation is even more startling when we consider Professor Freudenthal's remarks on fatigue. An appre-

ciable number of fatigue tests have been carried out, very few have caused fatigue failure and their general import seems to be that the fatigue strength of prestressed concrete relative to its static rupture strength is higher than that of any other structural material. It may be noted in passing that it is rare that there is any appreciable variation in stress in the anchorage zones of prestressing tendons.

#### S U M M A R Y

Professor Freudenthal's statement on the safety of prestressed concrete as affected by creep and fatigue is indefensible.

His remarks on rupture and working loads are particularly startling and are contrary to all experimental results obtained so far.

#### ZUSAMMENFASSUNG

Die von Professor Freudenthal vertretene Auffassung betreffend der Sicherheit von vorgespanntem Beton im Zusammenhang mit dem Kriechen und oft wiederholter Beanspruchung ist nicht haltbar.

Im Besonderen sind die Bemerkungen über die Bruchsicherheit und die Arbeitsfestigkeit erstaunlich und widersprechen jeden bisherigen Versuchsergebnissen.

#### R E S U M O

A comunicação do Professor Freudenthal acerca do efeito da fluência e da fadiga sobre a segurança das estruturas de betão preeforçado não é defensável.

As observações apresentadas acerca das cargas de rotura e das cargas de serviço são particularmente surpreendentes e contradizem todos os resultados experimentais obtidos até hoje.

#### R É S U M É

La communication du Professeur Freudenthal concernant l'influence du fluage et de la fatigue sur la sécurité du béton précontraint n'est pas défendable.

Les observations présentées sur les charges de rupture et de service sont particulièrement surprenantes et contredisent tous les résultats expérimentaux obtenus jusqu'à présent.