

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

Band: 11 (1980)

Artikel: Parallel strand stays. Static and fatigue strength

Autor: Xercavins, P. / Mondorf, P.E.

DOI: <https://doi.org/10.5169/seals-11364>

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

Download PDF: 23.02.2026

ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>



P. XERCAVINS
Technical Advisor, E.P.
P.E. MONDORF
Chief Engineer, M.Sc.

PARALLEL STRAND CABLE STAYS - STATIC AND FATIGUE STRENGTH

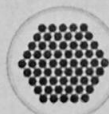
RESUME

THE 7-WIRE STRAND USED IN PRESTRESSING CABLES MAY ALSO BE USED FOR CABLE STAYS PROVIDED THAT CERTAIN MEASURES ARE TAKEN TO ENSURE ADEQUATE FATIGUE STRENGTH.

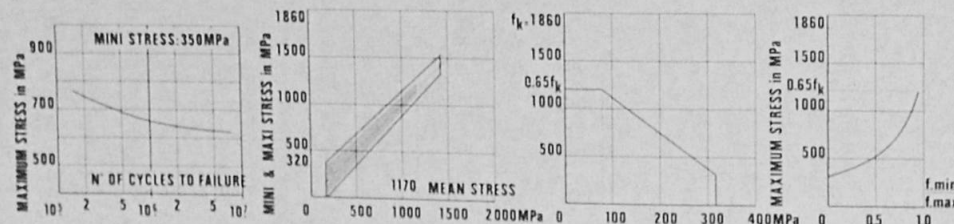
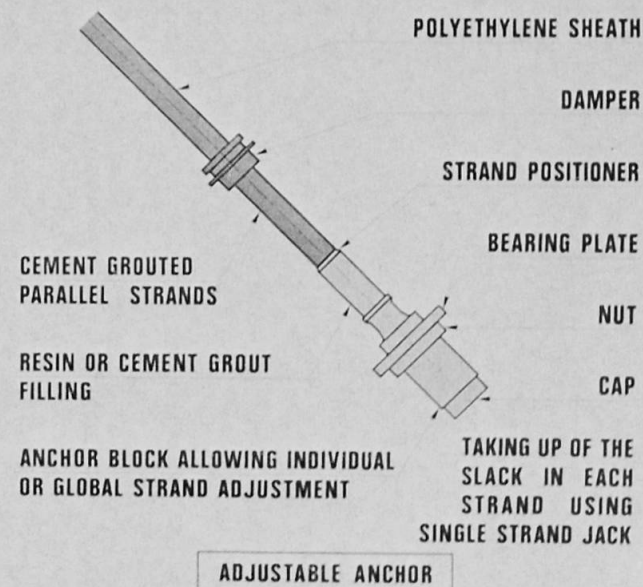
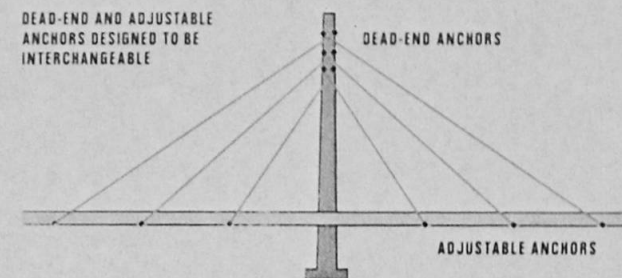
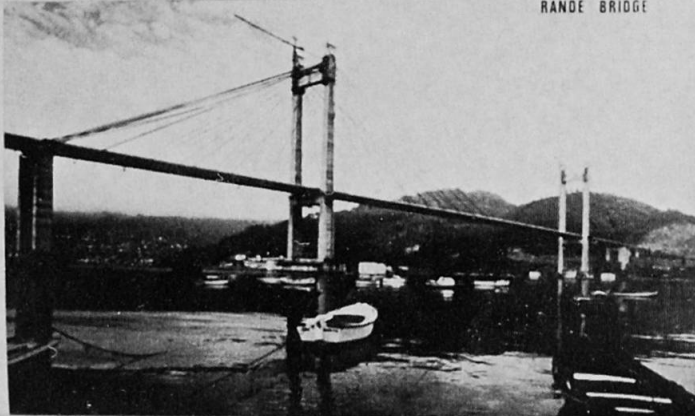
THESE MEASURES HAVE BEEN TESTED IN LABORATORIES AND THE RESULTS HAVE SHOWN THAT WITH PARALLEL STRANDS, CABLE STAYS OF THIS TYPE MAY HAVE VIRTUALLY THE SAME FATIGUE STRENGTH AS THAT OF THE INDIVIDUAL STRANDS OF WHICH THEY ARE CONSTITUTED.

TYPE	FORCE			
	45% G.U.T.S.		100% G.U.T.S.	
	T	kN	T	kN
37H15	441	4326	980	9613
61H15	727	7132	1616	15853
91H15	1084	10634	2410	23642

61H15 CABLE



RANDE BRIDGE



FATIGUE ENDURANCE OF A SEVEN-WIRE STRAND SPECIALLY DESIGNED FOR CABLE-STAYS

SMITH DIAGRAM AT 2.10⁵ CYCLES

MAXIMUM PERMISSIBLE STRESS ACCORDING TO STRESS VARIATION IN: ABSOLUTE VALUE RELATIVE VALUE



PARALLEL STRAND STAYS - STATIC AND FATIGUE STRENGTH

P. XERCAVINS

Technical Advisor, E.P.
FREYSSINET INTERNATIONAL
PARIS, FRANCE

P.E. MONDORF

Chief Engineer, M.Sc.
FREYSSINET INTERNATIONAL
PARIS, FRANCE

A type of stay has been developed using parallel prestressing strand anchored by special stay anchor devices which comprise the following parts :

- an anchorage block, which makes it possible to anchor the strands either by 3-piece jaws and wedge action, or by swaged grips,
- a trumpet, which permits the strands to arrive to the anchor block with the right angle and spacing,
- a trumpet extension (heavy steel pipe) the length and gauge of which have been selected in order to reduce the range of stresses transmitted to the anchorage,
- a light steel pipe used to extend the stay anchor device for structural reasons.

The stay anchor devices exist both in fixed and adjustable versions. In the adjustable version part of the trumpet length is replaced by a steel tube with an outer thread which allows adjustment by turning a collar. The anchors are filled with resin after stressing.

The bundle of parallel strands is enclosed by a polyethylene pipe which after the final stressing of the stay is filled with cement grout for protection against corrosion.

Generally a neoprene damper is inserted between the light steel pipe and the structure in order to restrict wind induced oscillations in the stays.

The strands may be threaded and tensioned one by one or the whole stay may be preassembled.

The stay cable may be assembled from parallel steel strands conforming to current standards for prestressed concrete strand, but additional fatigue requirements have to be specified. Typical WOHLER-curve and SMITH diagram for good quality prestressing strand are shown on the poster.

The static and dynamic strength of the described stay type has been checked through tests of models containing up to 19 strands of 15 mm nominal diameter undertaken by official laboratories in various countries. Such tests have shown that a fatigue life expectancy of 2×10^6 cycles may be safely admitted within the performance band traced inside the SMITH-diagram of the individual strand.

From the performance band a linear relationship is deduced between the safe values of upper stress and stress range as shown graphically. The safe upper stress is also shown as a function of the ratio between stress range and upper stress.

The tests have further shown that the dynamic properties of a bundle of parallel strands are similar to those of a bundle of parallel wires.

Discussions around the POSTER concerned especially the dynamic strength of the stays, their durability, construction methods, damping of wind oscillations etc...

Parallel strand stays were used for such bridges as the BROTONNE bridge in FRANCE and RANDE bridge in SPAIN, both built in the late seventies.