

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

Band: 7 (1964)

Artikel: Discussion: friction-grip-bolts (high strength bolts)

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DOI: <https://doi.org/10.5169/seals-7953>

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IIb4

Discussion - Discussion - Diskussion

Friction-Grip-Bolts (High Strength Bolts)¹⁾

Boulons à haute résistance

HV-Schrauben

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We can, I believe, accept as generally agreed that:

1. A "turn of the nut" method is the best.
2. Bolts should be tensioned into plastic region and properly designed for this purpose.
3. Very high strength bolts are generally economic.
4. Conservative coefficients of friction should be adopted, to allow for site conditions as against laboratory ones.
5. Washers are not required under the head.

Ultimate reliance on friction bolts as shear pegs is permissible only when the hole is not more than about 1 mm greater than the shank of the bolt. With *waisted bolts* the holes are about 6 mm larger and the slip of such amount could not normally be tolerated.

Shear bolts should be close tolerance ones tightened to near yield stress to prevent corrosion between faying surfaces and of the bolt itself.

Today, the principal problem with grip bolted joints is corrosion and not tightening.

Briefly the problems are:

1. If faying surfaces are to be left unpainted, what is the best method of protecting them from (I) paint during fabrication, and (II) corrosion during fabrication, erection and in service.
2. Tests in England have shown that frictional resistance of cleaned surfaces can be diminished by 15% to 20% after weathering; should all surfaces in contact be cleaned immediately prior to bolting up.
3. If faying surfaces are left unpainted, corrosion can set in during the life of the structure, as was the case with rivets. Such corrosion would tend to tear the bolted parts apart and thus induce additional tensile stresses

¹⁾ See "Preliminary Publication" — voir «Publication Préliminaire» — siehe «Vorbericht», IIb, p. 363.

in the tensioned bolts, possibly breaking them. Obviously, what we need is an adhesive protective substance.

4. Bolts themselves are very susceptible to corrosion. The shank and the head can be protected prior to use, but the nut gets punished by tightening and may have very sharp edges. Normal painting is not very effective and special treatments after tightening are required.

It would be valuable to collect as much information as possible on the long term behaviour of bolts and flaying surfaces. . . . In this respect co-operation with the International Union of Railway Offices for Research and Experiments should be established as soon as possible to avoid any duplication of research efforts.

Summary

The techniques of using friction grip bolts seems to have been solved and the main problem today is the treatment of surfaces in contact to obtain best coefficients of friction and to prevent corrosion during fabrication and, what is more important, during the life of the structure.

Résumé

Il semble qu'on est parvenu à maîtriser les techniques d'emploi des boulons haute résistance et que le principal problème, aujourd'hui, soit celui du traitement des surfaces de contact en vue d'obtenir les coefficients de frottement optimaux et de prévenir la corrosion pendant la construction ainsi que, ce qui est plus important, durant toute la vie de l'ouvrage.

Zusammenfassung

Die Technik der Anwendung von hochfesten Schrauben scheint heute gelöst zu sein; das Hauptproblem besteht noch in der Behandlung der Kontaktflächen zur Erreichung günstiger Reibungskoeffizienten unter Verhinderung der Korrosion während der Herstellung und, was noch wichtiger ist, im Betrieb.