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IN 86-94

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

November 6, 1986

IE INFORMATION NOTICE NO. 86-94: HILTI CONCRETE EXPANSION ANCHOR BOLTS

Addressees:

All nuclear power reactor facilities holding an operating license or a construction permit.

Purpose:

This notice is provided to inform recipients of a revision to the published ultimate tensile capacities for 1/2-inch-diameter Hilti Kwik bolts that could potentially affect pipe support designs covered by IE Bulletin 79-02. This revision resulted from a Hilti review of all onsite test data developed at nuclear power plants after a 10 CFR Part 21 report identified that onsite tests at the Susquehanna plant produced results that were significantly below the published values contained in Hilti's "Architects and Engineers Anchor and Fastener Design Manual" for several sizes of anchor bolts.

It is expected that recipients review this information for applicability to their facilities and consider actions, if appropriate. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Testing of various sizes and embedment depths of Hilti Kwik and Super Kwik expansion anchor bolts was performed at the Susquehanna Steam Electric Station during March 1985 and during March/April 1986. The results of these tests established average ultimate tensile capacities of some expansion anchor bolts that were substantially lower than the published values in the Hilti manual. These results were reported to the NRC by Dravo Constructors, Inc. in a Part 21 report in May 1986. The worst-case result from the Susquehanna onsite tests established an average ultimate tensile capacity for the 1/2-inch anchor bolt with a 5-1/2-inch embedment that was 59% of the value published in the Hilti manual. Other significantly lower values reported by Dravo included 5/8", 3/4", 1", 1-1/4-inch Kwik bolts and the 1-inch Super Kwik bolt. All of these lower values were associated with the deeper embedment depths where failure is governed by anchor pullout. In response to the data generated at Susquehanna, Hilti performed a statistical evaluation of its available onsite test results and provided these results to the NRC in September 1986. Hilti's evaluation of the onsite test data supported the values published in its manual for all anchor bolt sizes except for 1/2-inch bolts. Hilti stated it would revise the

values for the 1/2-inch-diameter Kwik bolt. A copy of the revised ultimate tensile capacity values for the 1/2-inch-diameter Hilti Kwik bolts is provided in Attachment 1.

Discussion:

A substantial amount of data scatter in the testing of concrete expansion anchor bolts is expected and this data scatter was considered in selecting the appropriate safety factors for design purposes. Although Hilti's evaluation of all plant test data confirmed its ultimate tensile capacities for most sizes of anchor bolts published in the manual, it appears that a greater amount of data scatter exists in the results for deeper embedment lengths. Apparently, the higher capacities that can be achieved for deeply embedded bolts are more sensitive to the exact concrete mix properties and/or installation techniques. Licensees using the ultimate capacities from the Hilti manual should be aware that the concrete mix and installation techniques at their facilities could have a significant impact on the results for the deeper embedment capacities. These concerns should not impact licensees with facilities that have established allowable working loads for expansion anchors based on onsite tests or facilities that establish allowable working loads based on the shorter embedment lengths.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the Regional Administrator of the appropriate regional office or this office.

Edward L. Jordan, Director
Division of Emergency Preparedness
and Engineering Response
Office of Inspection and Enforcement

Technical Contact: J. R. Fair, IE
492-4509

Attachments:
1. Revised Ultimate Tensile Values for 1/2-Inch-Diameter Kwik Bolt
2. List of Recently Issued IE Information Notices

REVISED ULTIMATE TENSILE VALUES
1/2" Diameter Kwik-Bolt

		Concrete Strength		
Diameter	Embedment	2000 psi	4000 psi	6000 psi
1/2"	2-1/4"	4545	5510	6845
	2-3/4"	5800	7200	7800
	3-1/2"	7000	9000	10000
	4-1/2"	7275	10000	10500
	6"	9000	10000	11000

Attachment 2
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LIST OF RECENTLY ISSUED
IE INFORMATION NOTICES

Information Notice No.	Subject	Date of Issue	Issued to
86-93	IEB 85-03 Evaluation Of Motor-Operators Identifies Improper Torque Switch Settings	11/3/86	All power reactor facilities holding an OL or CP
86-82 Rev. 1	Failures Of Scram Discharge Volume Vent And Drain Valves	11/4/86	All power reactor facilities holding an OL or CP
86-92	Pressurizer Safety Valve Reliability	11/4/86	All PWR facilities holding an OL or CP
86-91	Limiting Access Authorizations	11/3/86	All power reactor facilities holding an OL or CP; fuel fabrication and processing facilities
86-90	Requests To Dispose Of Very Low-Level Radioactive Waste Pursuant to 10 CFR 20.302	11/3/86	All power reactor facilities holding an OL or CP
86-89	Uncontrolled Rod Withdrawal Because Of A Single Failure	10/16/86	All BWR facilities holding an OL or CP
86-05 Sup. 1	Main Steam Safety Valve Test Failures And Ring Setting Adjustments	10/16/86	All power reactor facilities holding an OL or CP
86-25 Sup. 1	Traceability And Material Control of Material And Equipment, Particularly Fasteners	10/15/86	All power reactor facilities holding an OL or CP
86-88	Compensatory Measures For Prolonged Periods Of Security System Failures	10/15/86	All power reactor facilities holding an OL or CP; fuel fabrication and processing facilities

OL = Operating License
CP = Construction Permit

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