US Army Corps of Engineers

ENGINEERING AND CONSTRUCTION BULLETIN

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Subject: Window Fragment Hazard Level Analysis Software

Applicability: Guidance

1. This bulletin announces the availability of an updated version of the Window Fragment Hazard Level Analysis computer program (HAZL v1.2). HAZL uses a single degree of freedom analysis to calculate glazing response to a blast loading and a debris transport model for predicting fragment trajectory. The program can model monolithic glass or plastic windows, laminated windows, insulated glass units and windows retrofitted with anti-shatter film. The user inputs the window geometry, glazing type, material and thickness, and blast load. Output includes the hazard level, glazing response parameters, reaction loads, and required frame bite. The program can also produce pressure-impulse curves for the specified window to be used in vulnerability and security planning analyses.

2. Version 1.2 is an update of previous releases and offers improved modeling of glazing materials, resistance, rate effects and insulated glass units. Also, the recently developed Multi-Hit Glass Penetration (MHGP) model and Shard Fly-Out Model (SFOM) have been added, allowing the user to predict the injury hazard caused by glass shards striking personnel for three types of monolithic window glass. The models compute the propagation of the glass shards, determine which shards would impact a person, and calculate the injury those shard penetrations would cause. Using HAZL v1.2, the determination of hazard levels can be based on either the post event location of window glass fragments within the building or the possible fragment penetration injury to building occupants. A help file is also included with the program.

3. Distribution of HAZL is authorized to U.S. Government agencies and their contractors. This software can be downloaded from the USACE Protective Design Center website:
https://pdmcx.pecp1.nwo.usace.army.mil/software/hazl/index.php.

4. The HQUSACE point of contact for this bulletin is Joseph Hartman, CECW-CE-H, 202-761-0301.

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