inter·noise 96
25th Anniversary Congress – Liverpool

INCE: 73.5

THE NEW LABORATORY FACILITIES OF THE LABORATORY OF BUILDING ACOUSTICS

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1. INTRODUCTION

Several theoretical, practical and engineering reasons lead to the decision to build up new a acoustical laboratory in the process of reconstructing the old ones. This paper introduces the laboratory facilities, describing the test program and presenting some technical and acoustical properties of it.

2. TECHNICAL ENVIRONMENT

The test facilities have been built up on the second floor in an existing industrial-type hall, where different types of test equipments are operating, characteristic of constructional industry. The load bearing capacity of the floor slab, the available plan surface and the height in the hall are limited, because of the construction of the building, and the other test facilities. The construction of the new facilities are made of brick and reinforced concrete. Additional elements have been made of gypsum plates on frame, common floating floor, etc.

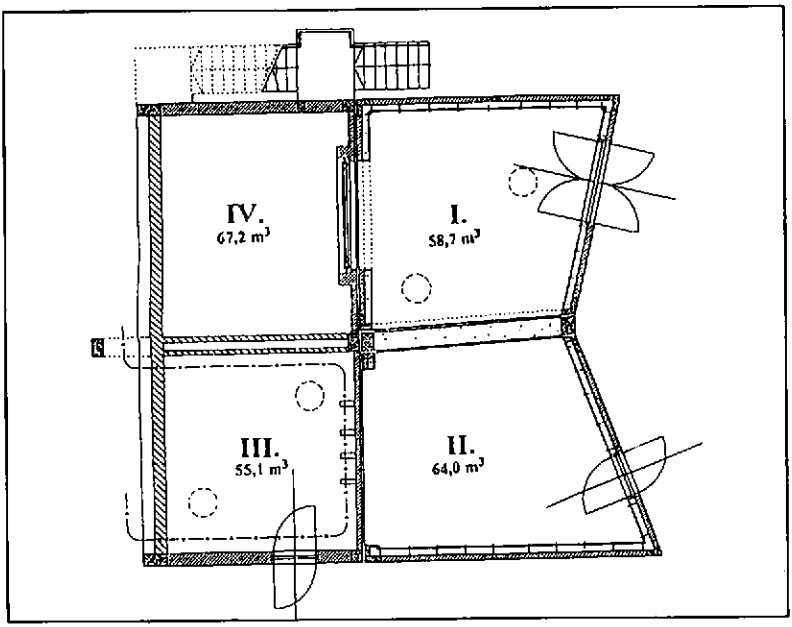
3. TEST PROGRAM, ACOUSTICAL CHARACTERISTICS

Before determining the test program of the new laboratory facilities, several factors were considered : the existing laboratory capacities in Hungary, our traditional research-development activities, the personal interest of the staff, the estimated development of the constructional industry, etc. The requirements - sizes, materials, masses - of different laboratories have been analysed, the common elements have been selected. The field location was also considered as

well as the technological process - the transfer and storage of constructions, the constructional work, etc. The available surface and volume led to define four horizontally adjacent test chambers with the volume of 55-67 m^3. Figure 1 presents the plan of the laboratory, and Table 1. summarises the test program. It can be seen, almost all the possible directions are utilised for measurements.

The test program contains standardised measurements products and field models for research, development and teaching purposes.

Figure 1. The plan of the laboratory



The maximal sound reduction index having been measured until now, belonging to a special wall construction, (in direction I -> II) is shown in Fig 2, and that of a special door slab (IV ->I) is presented in Fig 3. In both cases the word maximal means the maximum, until now. They are not the upper limits of the laboratory in the given measurement function, and direction. In all these cases the radiated power was controlled by vibration measurements. These tests support, the presented results are not the upper limits.

Table 1 . Test program of the laboratory facilities

Sign	Description	Rooms
R	Airborne sound insulation of walls, without flanking sound transmission	I - II
R'	Airborne sound insulation of walls, with flanking sound transmission	III - IV
R	Airborne sound insulation of windows, doors and small size elements without flanking paths	IV - I
D_n	Normalised sound pressure level difference of ventilating ducts	III - I
ΔL_n	Improvement of normalised impact sound pressure level of floor coverings	Out - IV
L'_n	Normalised impact sound pressure level of a staircase model	Out - IV
L_{ann}	Installation sound pressure level of water supply equipments	Out - II
L_A	Installation noise in a field model	Out - III

Remark : Out means the outer surface of the laboratory.

Fig 2. Max R of a wall construction
R dB $R_W = 71$ dB

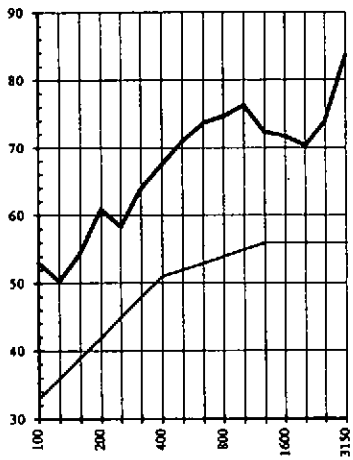
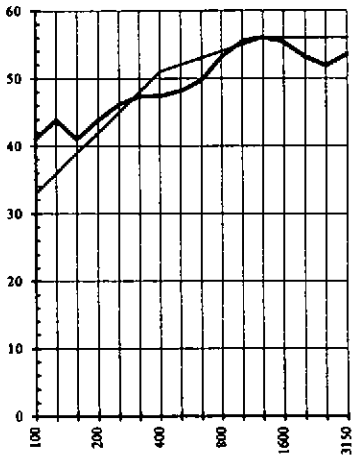


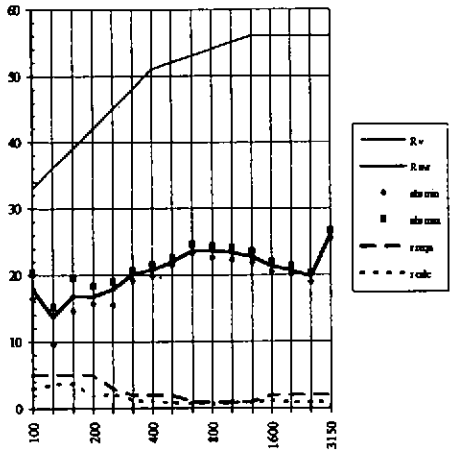
Fig 3. Max R of a door slab
R dB $R_W = 52$ dB



A light weight steel plate was used to determine the repeatability of the measurement process . Fig 4. presents the results of a set of experiments of 34

measurement. Abs min and abs max mean the absolute minimum or maximum measured R value in the **given frequency band**, selected from the complete set of measurements. The weighted sound reduction index of the present construction varies between 21 and 22 dB. The measurement process consists of two loudspeaker positions, and two directions in each case. The field average has been measured by rotating microphone boom. No diffusing elements have been used.

Fig 4 Repeatability test



4. ADMINISTRATIVE BACKGROUND

To build up the new test object, presented above, a project, named "*The development of an acoustical laboratory to be accredited* " has been defined and organised. It has been sponsored by foundations, the "Human Resources Development Program HU 3313 , project number 1207/2 " and some constructional firms. Theoretical support has been got from the Ministry of Environmental protection and the Acoustical Complex Committee of the Hungarian Academy of Sciences . The first organisational steps were done at the end of 1992, the first laboratory test - that of a door - was completed in May, 1995. The complete work - all levels of planing, administration, controlling the constructional work, arranging the financing, etc. - has been carried out by the staff of the Institute of Building Constructions and Sanitary Engineering, where the Laboratory of Building Acoustics belongs.