

2.10 31630 ACOUSTICS FOR AUDITORIUMS AND CONCERT HALLS

1. Introduction

- 1.1 Room-Acoustical Criteria, Requirements
- 1.2 Time Criteria
- 1.3 Reverberation Time RT60
- 1.4 Bass Ratio (BR) (Beranek)

2. Energy Criteria

- 2.1 Strength Measure (G) (P. Lehmann)
- 2.2 Sound Pressure Distribution ('L)
- 2.3 Interaural Cross-Correlation Coefficient (IACC)
- 2.4 Center Time (t_s) (Kürer)
- 2.5 Echo Criterion (EK) (Dietsch)
- 2.6 Definition Measure C50 for Speech (Ahnert)
- 2.7 Speech Transmission Index (STI) (Houtgast, Steeneken)
- 2.8 Articulation Loss, Alcons, with Speech (Peutz, Klein)
- 2.9 Subjective Intelligibility Tests
- 2.10 Clarity Measure (C80) for Music (Abdel Alim)
- 2.11 Sound Coloration Measures (KT) and (KH) for Music (Schmidt)
- 2.12 Spatial Impression Measure (R) for Music (U. Lehmann)
- 2.13 Lateral Efficiency (LE) for Music (Jordan), (LF) (Barron) and (LFC) (Kleiner)
- 2.14 Reverberance Measure (H) (Beranek)
- 2.15 Register Balance Measure (BR) (Tennhardt)

3. Planning Fundamentals

- 3.1 Introduction
- 3.2 Structuring the Room Acoustic Planning Work
- 3.3 General Structure
- 3.4 Room Form and Sound Form
- 3.5 Primary Structure of Rooms
- 3.6 Volume of the Room
- 3.7 Room Shape
- 3.8 Ground Plan
- 3.9 Ceiling
- 3.10 Balconies, Galleries, Circles
- 3.11 Room Topography
- 3.12 Sloping of Tiers, Sight Lines
- 3.13 Platform Configuration in Concert Halls
- 3.14 Orchestra Pit

4. Secondary Structure of Rooms

- 4.1 Sound Reflections at Smooth Plane Surfaces
- 4.2 Sound Reflection at Smooth Curved Surfaces
- 4.3 Sound Reflections at Uneven Surfaces
- 4.4 Sound Absorbers
- 4.5 Sound Absorption Through Porous Materials
- 4.6 Sound Absorption by Panel Resonances
- 4.7 Helmholtz Resonators
- 4.8 Sound Absorption by the Audience

5. Variation of Room Acoustics by Construction or Electroacoustic Methods

- 5.1 Variable Acoustics
- 5.2 Fundamentals of Variable Acoustics

6. Electronic Architecture

- 6.1 Use of Sound Delay Systems for Enhancing Spaciousness
- 6.2 Ambiophony
- 6.3 ERES (Electronic Reflected Energy System)
- 6.4 Travel-Time-Based Reverberation-Time Enhancing Systems
- 6.5 Assisted Resonance
- 6.6 Multi-Channel-Reverberation, MCR
- 6.7 Modern Procedures for Enhancing Reverberation and Spaciousness
- 6.8 Acoustic Control System (ACS)
- 6.9 Reverberation on Demand System, RODS
- 6.10 LARES
- 6.11 System for Improved Acoustic Performance (SIAP)
- 6.12 Active Field Control, AFC
- 6.13 Virtual Room Acoustic System Constellation
- 6.14 CARMEN®
- 6.15 Conclusions and Outlook

References Books:

1. W. Ahnert and W. Reichardt, Grundlagen der Beschallungstechnik (Fundamentals of Sound Reinforcement Engineering), S. Hirzel Verlag Stuttgart, 1981.
2. Taschenbuch der Akustik (Handbook of Acoustics), Editors: W. Fasold, W. Kraak, and W. Schirmer. Verlag Technik, Berlin, 1984.
3. J. Meyer, Akustik und musikalische Aufführungspraxis (Acoustics and Music Presentation Practice), Verlag Erwin Bochinsky, Frankfurt am Main, 1995.
4. W.C. Sabine, Collected Papers on Acoustics, Cambridge: Harvard Univ. Press, 1923. 5. H. Kuttruff, Room Acoustics, 3rd Edition, Applied Science Publishers Ltd, London, 1991.