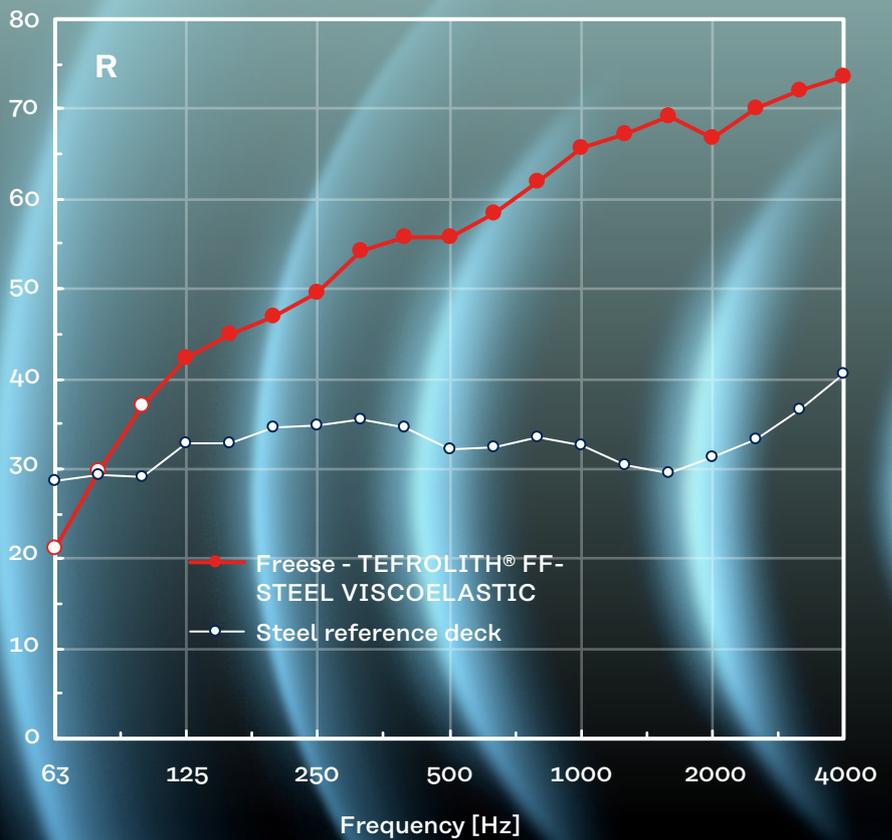


Noise Reduction

TEFROTEX® VISCOELASTIC
TEFROLITH® FF-STEEL
TEFROLITH® M



Noise Reduction

Today, reduction of noise and vibration are vital factors for comfort at sea. During the past decades international and national regulations regarding limitation of noise-levels in accommodation and working spaces for ships and offshore installations were getting more strict. For passengers on cruise vessels a low noise and vibration level is part of a pleasant holiday and a low noise-level is also an indicator for a relaxing cruise. For the crew on board vessels, platforms etc. low level of noise and vibration at working places and in accommodation areas are essential for health and safety on board.

Sound and noise

Noisereductionviafloorsystemsmansreducing the transmission of noise and vibration through the deck. For marine and offshore application usually three types of noise have to be regarded:

1. structure borne noise (e.g. vibration in the steel-structure caused by thrusters, engine etc)
2. airborne sound (e.g. noise from machinery room, but also from disco music or theatre on cruise vessel)
3. impact noise (special type of structure borne noise generated by impact to floors, e.g. service corridors)

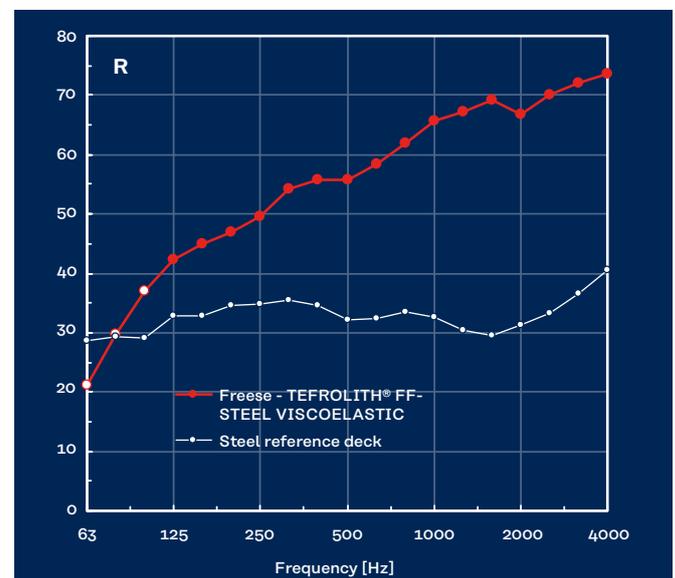
Analysis and prediction of noise sources are key areas addressed while designing and construction all kind of vessels, platforms and accommodation modules. To achieve an economical but most effective reduction of noise and vi-

bration, each source needs to be identified and addressed.

The use of low noise resilient mounted engines and low noise propellers are methods to reduce structure borne noise and vibration, but experience has shown that sufficient improvements cannot be obtained only by reducing the noise generation at its source.

One major element for noise in accommodation areas is noise radiation from the floors. Permanent research and development in our own laboratory in co-operation with universities and independent institutes guarantees the provision of consistently high quality and standard.

We would be pleased to support you in all questions of noise reduction in respect of floors. Kindly let us have your requirements.



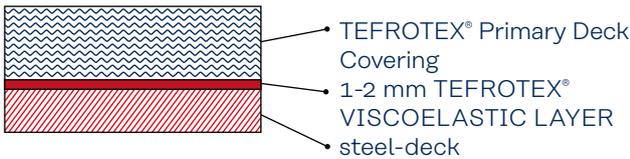
Damping Layer

Constrained viscoelastic damping systems developed by GTF are combinations of TEFROTEX® VISCOELASTIC with different top layers like TEFROTEX® Primary Deck Covering, or steel-tiles. TEFROTEX® VISCOELASTIC is a highly flexible polyurethane compound which

adheres to steel and aluminium decks and converts in combination with suitable top layers vibration into heat. TEFROTEX® VISCOELASTIC combined with steel-tiles can also be used on bulkheads etc. for reduction of noise caused by vibration of vertical surfaces.

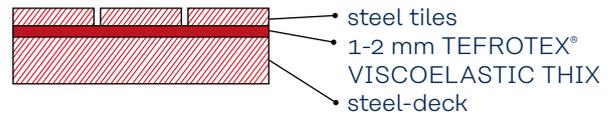
Structure-borne noise resulting from vibrations in the steel-structure - caused e.g. by the engine or propeller - are major reasons for noise-emissions on board vessels. Improved engines, propeller, bearings and construction are able to reduce the vibrations in the steel-structure partly. Use of constrained viscoelastic damping systems are a solution to minimize resulting noise in accommodation- and working areas. Furthermore impact noise can be reduced.

TEFROTEX® VISCOELASTIC plus TEFROTEX® Primary Deck Covering



Different systems with outstanding structure-borne noise damping results can be provided. Viscoelastic damping systems by GTF can be used also in wet areas and in areas which allow low building height only. Combinations of TEFROTEX® VISCOELASTIC damping layer and TEFROTEX® Primary Deck Covering are in addition able to level the deck before final flooring materials are applied.

TEFROTEX® VISCOELASTIC plus steel-tiles



Floating Floors

A floating floor construction can be described as a mass/spring system with a frequency of resonance corresponding to the stiffness of used mineral wool and weight of top layer. The optimum acoustic properties are characterized by:

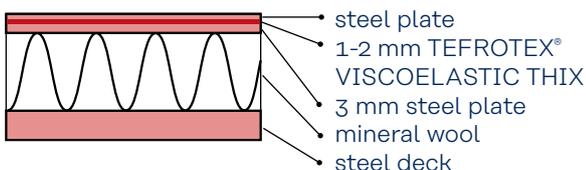
- Heavy mass of top layer
- Low stiffness of mineral wool
- Low resonance frequency in floating floor construction

Floating floors provide excellent reduction of airborne noise and high sound reduction and damping properties. Floating Floor Systems by GTF means a combination of mineral wool and different top layer which provide in addition to noise insulation properties also thermal insulation and A-60 class approval – partly also in-

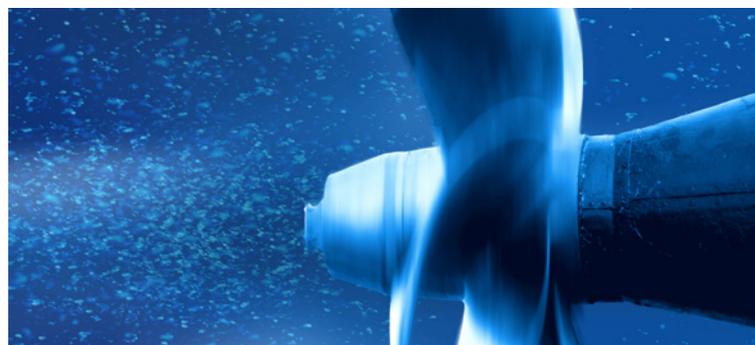
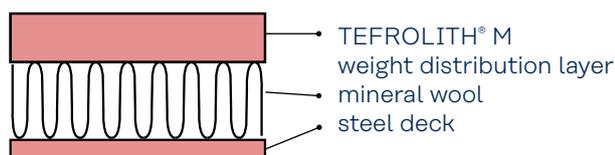
cluding viscoelastic damping layer. Basically, we provide two different types of floating floors: TEFROLITH® FF-STEEL is a combination of mineral wool and steel-plates. Furthermore we provide standard floating floor TEFROLITH® M – this construction is a floating floor consisting of mineral wool and weight-distribution layer based on mortar system with lightweight fillers. Both systems can be combined with TEFROTEX® VISCOELASTIC plus steel plate in needed thickness as per requirements.

On many projects a mixture of airborne and structure-borne noise causes higher demand in noise reduction. Combination of damping layer and floating floors developed by GTF provide best noise reduction properties for wide frequency range by combining benefits of TEFROTEX® VISCOELASTIC damping layer and TEFROLITH® floating floors. Depending on requirements different options are possible – also including A-60 approval.

TEFROLITH® FF-STEEL



TEFROLITH® M



Rules and Guidelines

SOLAS II-1 reg 36
IMO Res A.486(XII) Code on
Noise Levels on Board Ships
HSC 2000 Code, Chp 10.4
NORSOK C-002 Working environment
NORSOK C-002 Architectural Components and
Equipment
DNV Tentative rules for classification of ships
Lloyd's Register Comfort Class
GL Harmony Class
Norway Marine Authority
RINA, ABS, BV and others



GTF Freese is well known as a leading supplier for all kind of noise and fire insulating shipfloors and viscoelastic damping layer. In order to meet the requirements of the market GTF has carried out several research and development programs. The results of these programs provide the solution for noise reduction requirements for any marine or offshore application.

For further support please do not hesitate to contact us!

Selection of available Noise Test

Our products have been tested at independent institutes – detailed data is available upon request.

