

**IMO Resolution A.754(18)
Fire Resistance Tests
Fire Safety Onboard Ships**

BY

**Hans van de Weijert MSc MIFireE MBEng
Senior Consultant**

INTERNATIONAL FIRE CONSULTANTS LTD

20 Park Street

Princes Risborough

Buckinghamshire

HP27 9AH - UK

Tel: + 44 (0)1844 275500

Fax: + 44(0)1844 274002



Fire is all around

- Düsseldorf Airport (Germany)
- King's Cross Underground (UK)
- Tunnel Fires
 - Gotthard Alpine Tunnel
 - Mont Blanc Tunnel
 - Channel Tunnel
- Piper Alpha
- Campos Basin
- Shipping Fires
 - Limburg
 - Scandinavian Star
 - Diamond Princess



Objective of IMO Resolution A.754(18)



- Test method for the determination of the fire resistance of separating constructions
 - Steel Bulkheads
 - Steel Decks
- Separating constructions
 - Steel Divisions, special functions
 - Water tight
 - Flame integrity



Design Criteria

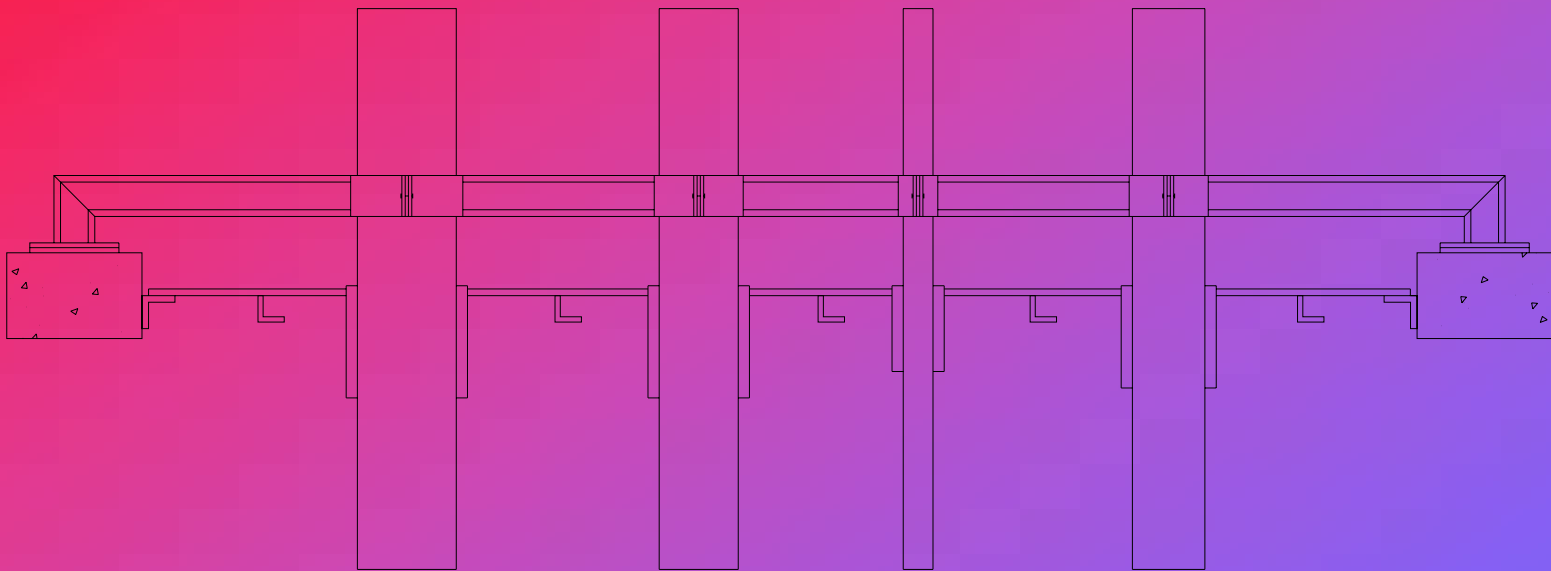
- Classification
 - “A” Class
 - “B” Class
 - “C” Class
- Allowable Temperature Rise (unexposed side)
 - Average, $\Delta T_{av} = 140^{\circ}\text{C}$
 - Maximum, $\Delta T_{max} = 180^{\circ}\text{C}$
- Insulation Classification
 - A-60, A-30, A-15, A-0 (Steel)
 - B-30, B-15, B-0
 - F-30, F-15, F-0



Test Specimen Size

- Minimum Dimensions are:
 - 3040 × 2440 (length × Width) Steel Decks
 - 2500 × 2440 (Height × Width) Steel Bulkheads





The Test Specimen Before Heating



Design Consideration

- Steel Deck or Bulkhead (Orientation of the division)
- Fire resistance requirement, A0 – A60
- Dimensions of the conduit sleeve
- Material
- Diameter
- Wall Thickness of pipe
- Insulation: type, thickness, length
 - Division
 - Pipe
 - Conduit Sleeve



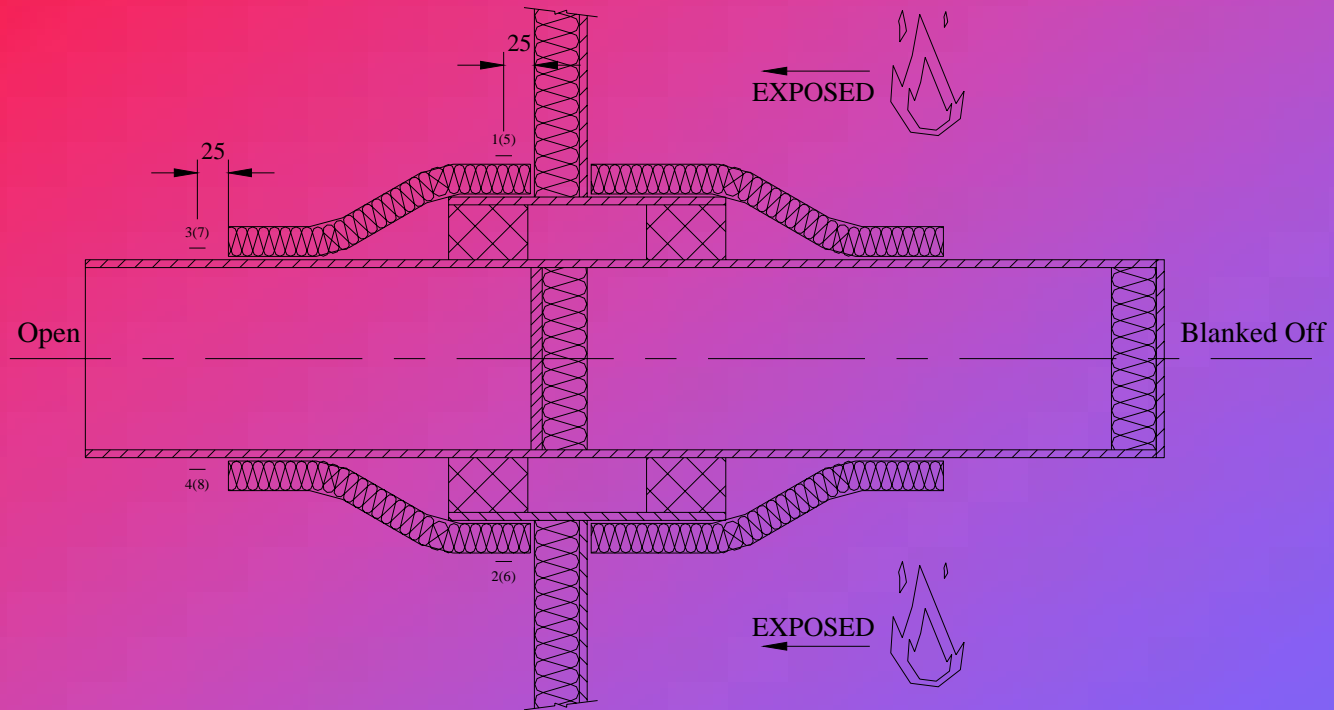
Tricks to Enhance Fire Performance

- A barrier/plug inside of pipe



LEGEND

— LOCATION OF THERMOCOUPLES
1(5)



Position of the plug in the pipe



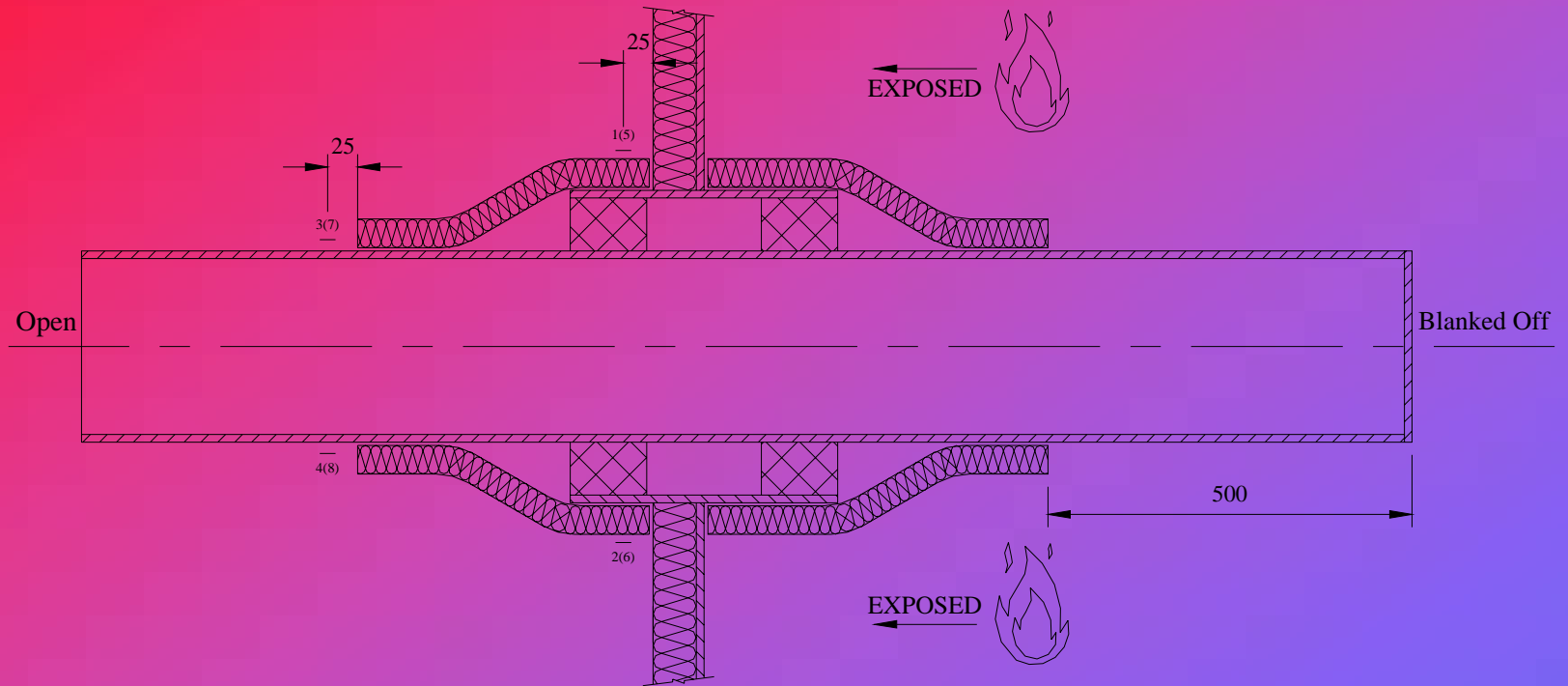
Tricks to Enhance Fire Performance

- Thicker Insulation on the division
- Fully insulated exposed pipe ends



LEGEND

— LOCATION OF THERMOCOUPLES
1(5)



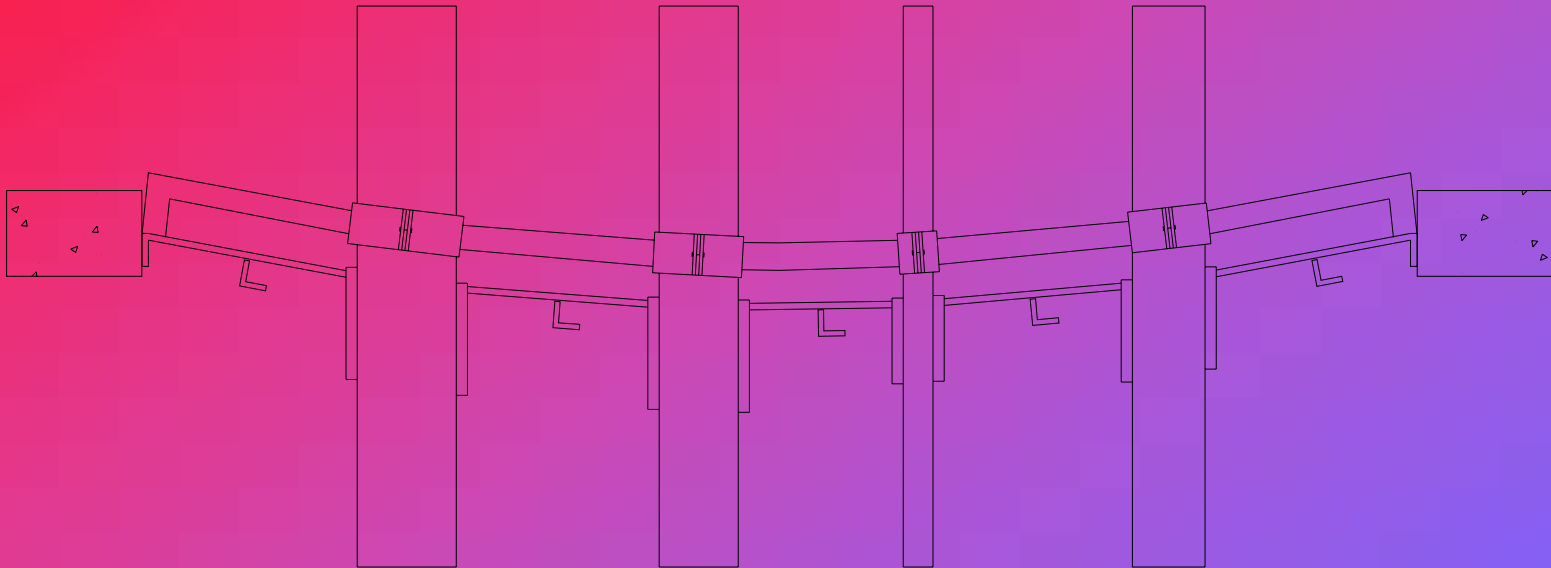
Pipe penetration in accordance with IMO resolution A 754 (18)



Tricks to Enhance Fire Performance

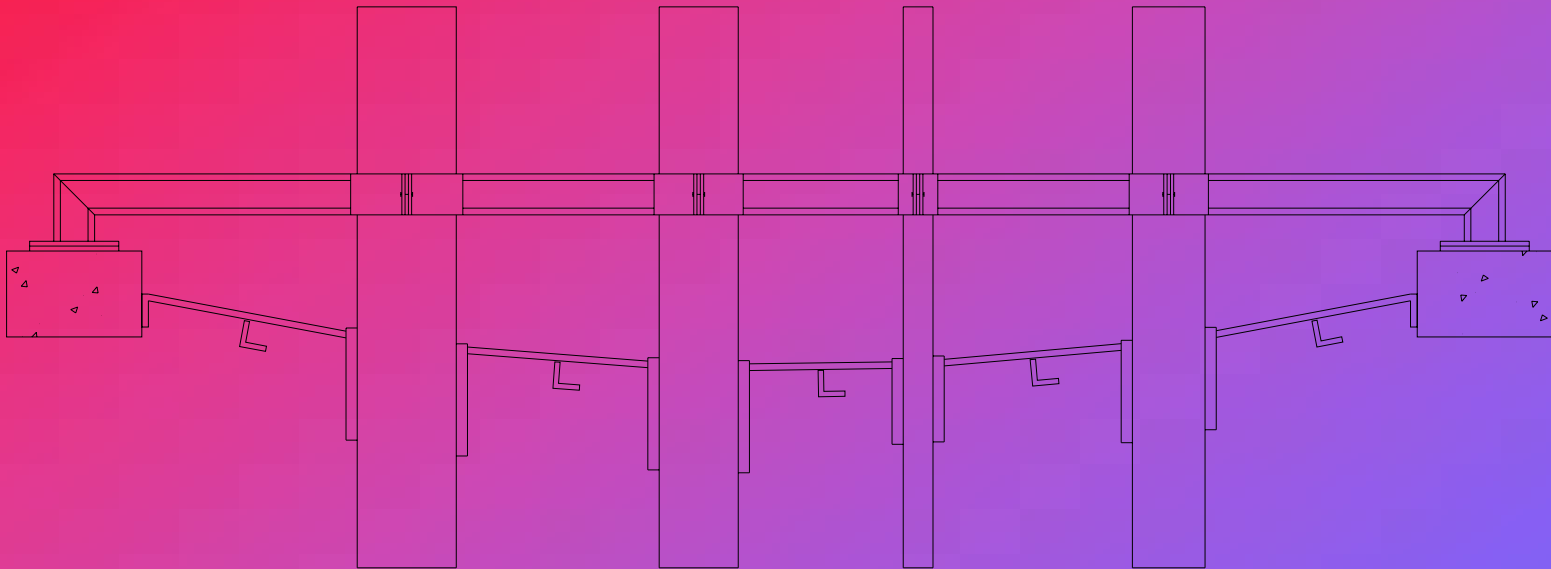
- Non-rigid steel support construction for pipes





The Test Specimen During Heating
Without rigid pipe supports.
(pipe supports not strong enough)





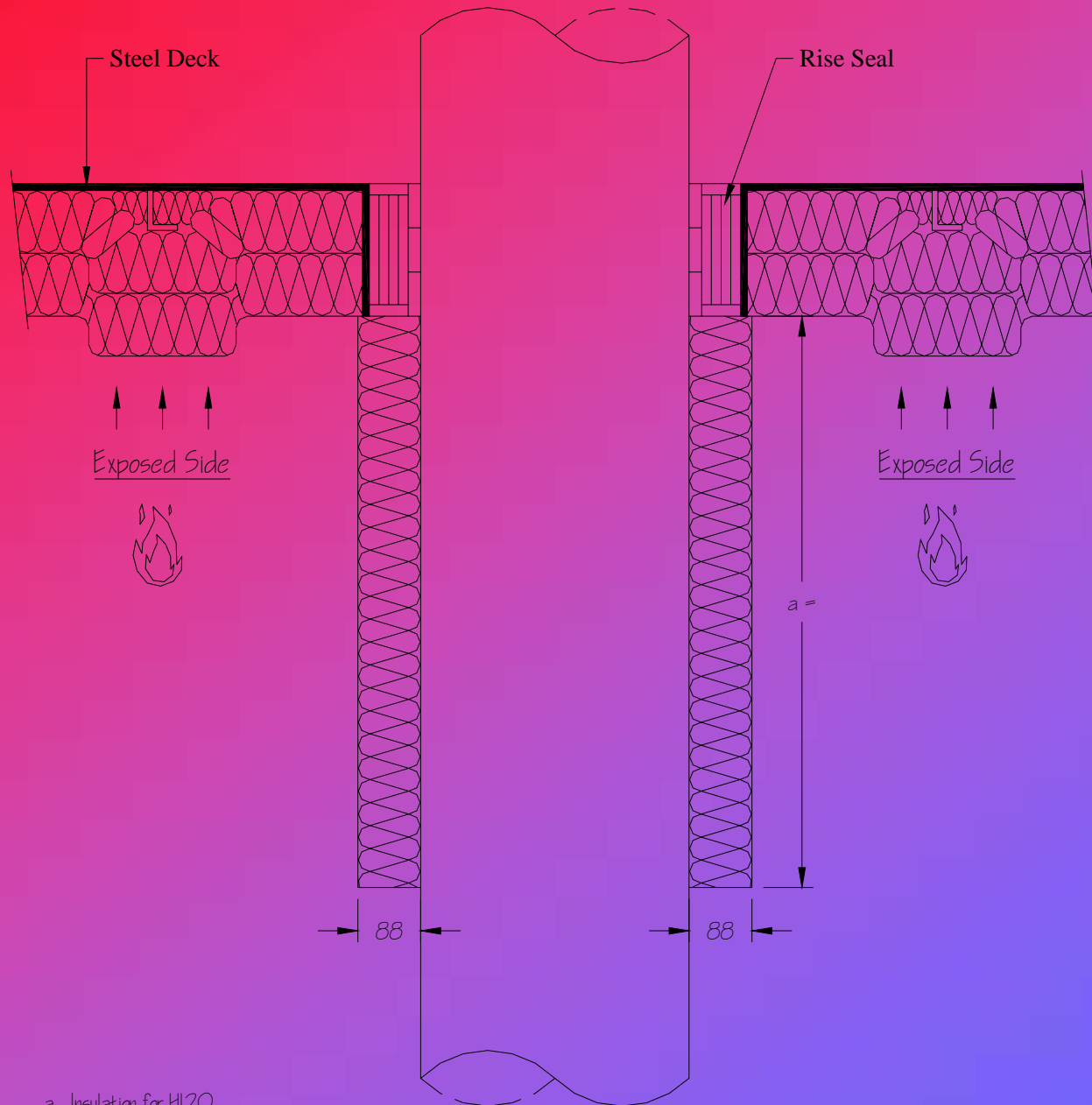
The Test Specimen During Heating
With fixings in accordance with IMO A 754 (18)
for pipe support.



Tricks to Enhance Fire Performance

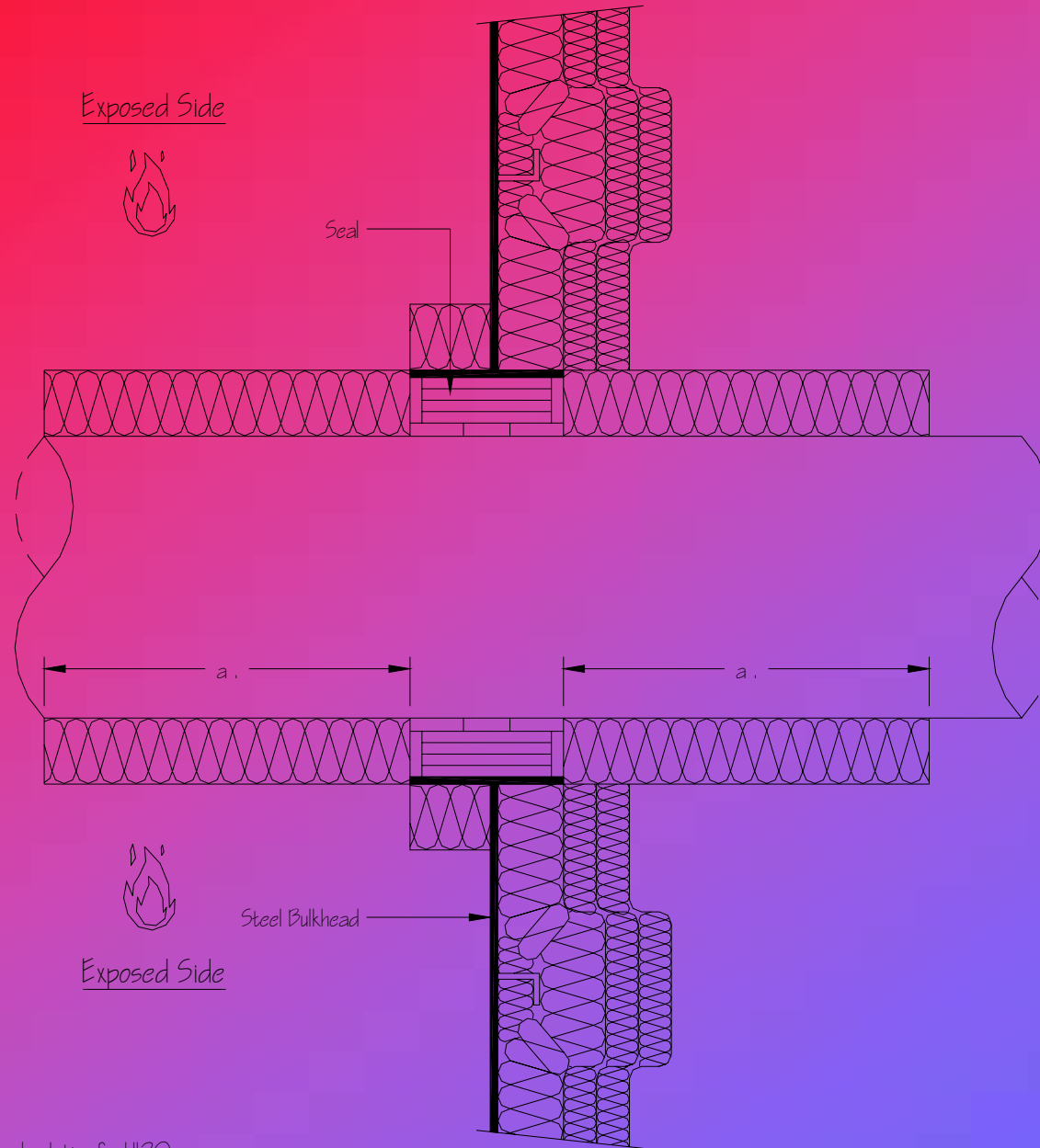
- Increasing the length of conduit sleeve (coaming)





a. Insulation for H120



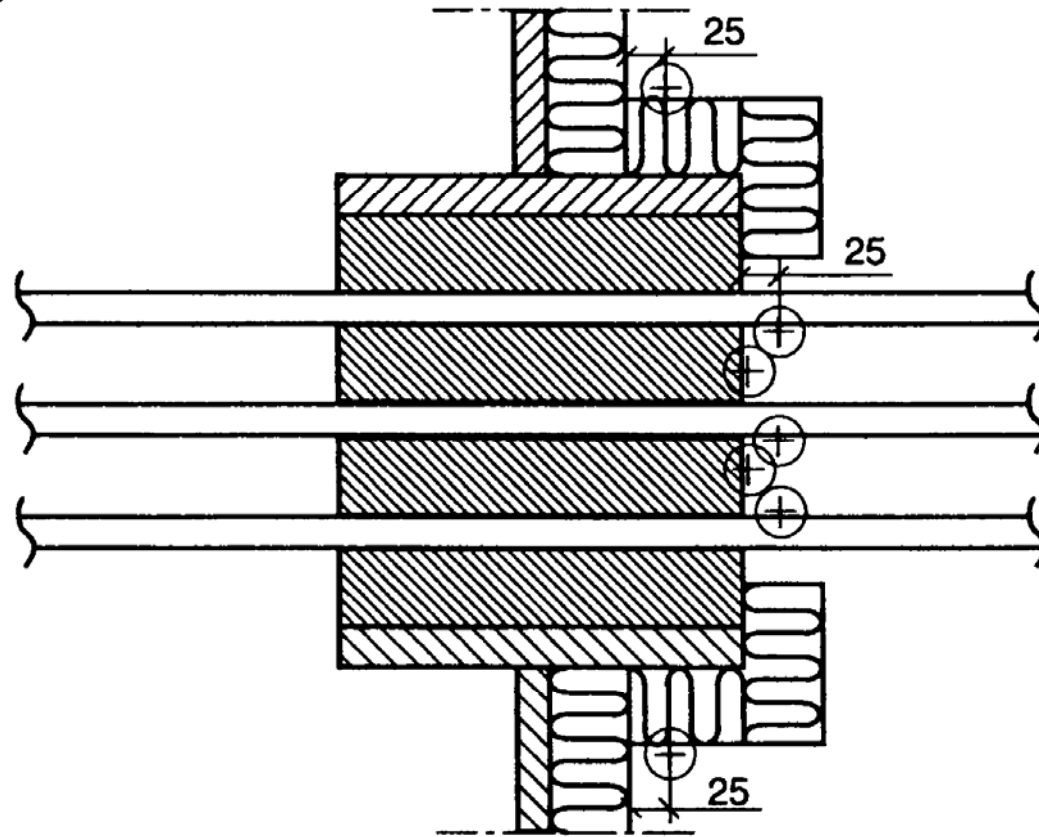


a. Insulation for H120



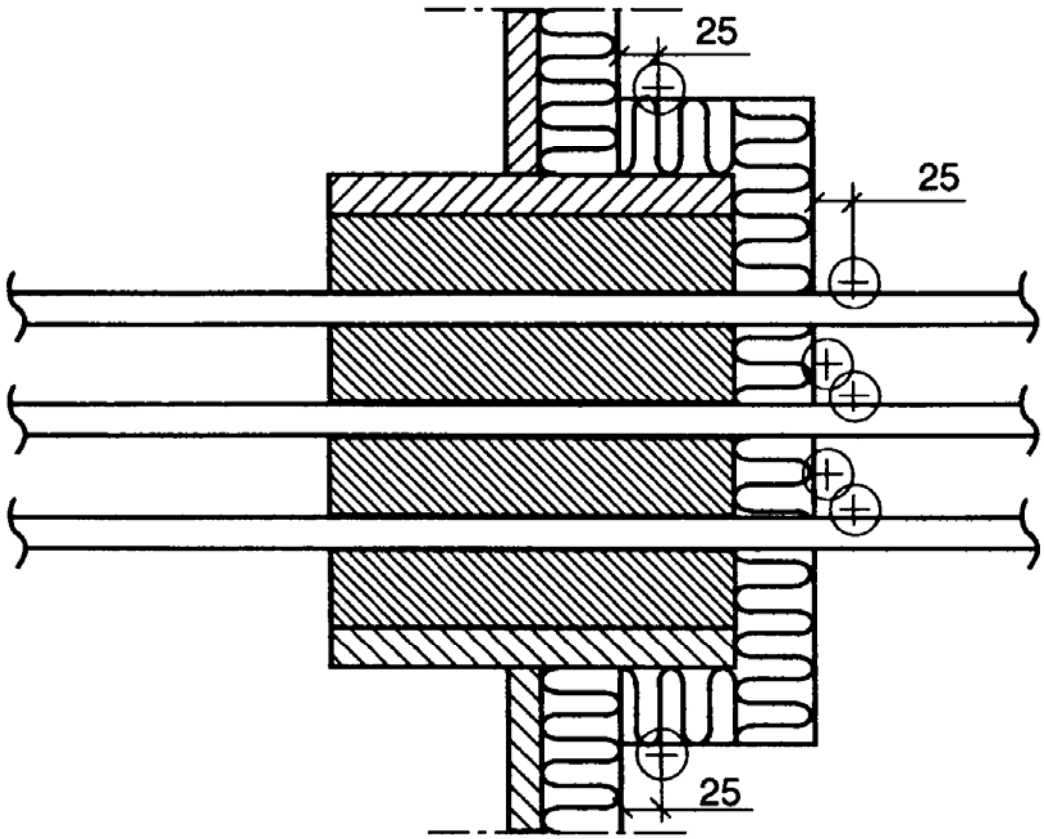
Partially insulated transit

Furnace



Fully insulated transit

Furnace



T_o
 h_o

Furnace
 1150°C

r_1

r_2

T_i
 h_i

Air

r_3

Insulation

R_i

R_1

R_2

R_0

T_i

T_1

T_2

T_3

T_o



Certificates

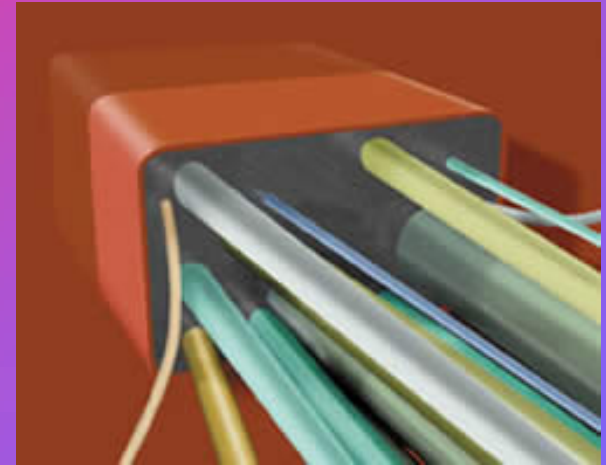
- Generalised
- Weaknesses
 - Density of pipes
 - Insulation
 - Length
 - Thicknesses
 - Position of transit

Example A-60



Product Selection

- Maximum aperture size of penetration
- Maximum combination of transits
- Maximum cable/pipe size
- Density of fill
- Spacing between cables/pipes
- Position of transit in deck/bulkhead
- Use of insulation
- Test Evidence – Deck and/or Bulkhead
- Classification, ie A-60, A-0
- Pipe Construction
 - Material ie Steel, Aluminium, Plastic
 - Wall thickness



Safety – Lifetime of Vessel

- Maintenance
 - Extra cables
 - Removal of cables
 - Cable coating
 - Drilling
- The Solution
 - Product Development
 - Modification of IMO Resolution
 - Precise and Uniform Approval Certificates



Product Development

- ACTIFIRE technology
- Impact on steel construction
 - Deformation
 - Displacement
- Safety First OR Money First



Recommendations to IMO

Resolution A.754(18)

- Specify minimum cable configuration
- Specify the cables to be tested
- Specify minimum cable fill (Density)
- Specify insulation, Divisions, Pipes, Length, Thickness
- Specify Pipe Construction
 - Material limitations, melting points
 - Wall thickness limitation, max?



Reccommendations to the Classification Societies

- Specify maximum size cable/pipe penetrations
- Specify spacing between transits
- Specify position of non-symmetrical transits
- Level of insulation
- Specify cable/pipe specifications (limitations)
- Installation details i.e Instructions, drawings

