TÜRK LOYDU

TL-I FTP

Interpretations of the FTP Code

January 2021

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Unless otherwise specified, these Rules apply according to the implementation dates as defined in each interpretation. See Rule Change Summary on TL website for revision details.

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TL- I FTP 2 Pipe and duct penetrations

(para. 5.1 of Res A.754)

In cases where a test specimen (deck) which includes the prototype penetration(s) is not mounted within a rigid restraint frame but is connected to the furnace roof by side wall coamings, the rigidity of the coamings is to be equivalent to that of a restraint frame and evaluated in accordance with Section 5.1 of A.754(18).

In cases where insulation is fitted to the test pipe(s), the distance(s) of 500 ±50 mm required in A.III/2.2.3 of A.754 to which the pipe should project is to be taken from the end of the insulation as this is considered an integral part of the penetration(s) being tested and it is necessary that a length of unprotected pipe is exposed to the furnace.

In all cases, the support and fixing of the test pipe(s) is to be by a framework mounted from the restraint frame such that any movement of the bulkhead or deck relative to the pipe(s) will be experienced by the penetration(s) being tested.

Note: This TL- I FTP 2 is implemented from 1 January 2001.

TL- I FTP 3 Fire Door

(FTP Code sub-section 5.3 and Annex 1, Part 3 – Test for “A”, “B”, and “F” class divisions)

Regulation

FTP Code sub-section 5.3 reads:

“5.3.1 The case-by-case approval means approval where a product is approved for installation on board a specific ship without using a type approval certificate.

5.3.2 The Administration may approve products using the applicable test procedures for specific ship applications without issuing a type approval certificate. The case-by-case approval is only valid for the specific ship.”

FTP Code Annex 1 FIRE TEST PROCEDURES PART 3 - TEST FOR "A", "B" AND "F" CLASS DIVISIONS reads:

1 Application

*Where products (such as decks, bulkheads, doors, ceilings, linings, windows, fire dampers, pipe penetrations and cable transits) are required to be "A" or "B" or "F" class divisions, they shall comply with this part.**

**Products tested for use in buildings have similar classification markings. However, they do not correspond to the classes in marine use.*

2 Fire test procedure

2.1 The products shall be tested and evaluated in accordance with the fire test procedure specified in resolution A.754(18). This contains test procedures also for windows, fire dampers and pipe and duct penetrations in its appendices.

2.2 Specimen sizes

2.2.1 For the purpose of this Code, the first sentence of paragraphs 2.1.1, 2.4.1 and 2.7.1 of the Annex to resolution A.754(18) is replaced by the following:

> *"The minimum overall dimensions of test specimen, including the perimeter details at the top, bottom and vertical edges, are 2,440 mm width and 2,500 mm height, except that the minimum overall dimensions of 2,440 mm in height and 4.65 m² in the exposed surface of the test specimen may be used in testing up to 31 December 1998. The approval expiry date is 31 December 2003 for approvals based on tests with such smaller test specimen."*

Note:

This Interpretation is implemented from 1 January 2011.

2.2.2 For the purpose of this Code, the first sentence of paragraphs 2.2.1, 2.5.1 and 2.8.1 of the Annex to resolution A.754(18) is replaced by the following:

> *"The minimum overall dimensions of test specimen, including the perimeter details at all the edges, are 2,440 mm width and 3,040 mm length, except that the minimum overall dimensions of 2,440 mm in length and 4.65 m² in the exposed surface of the test specimen may be used in testing up to 31 December 1998. The approval expiry date is 31 December 2003 for approvals based on tests with such smaller test specimen."*

2.2.3 The specimen sizes shall be given in the test reports.

2.3 Where thermal radiation through windows is required to be limited, the window assembly may be tested and evaluated in accordance with appendix 1 of this part.

2.4 Where ceilings or linings are required to be continuous "B" class ceilings or linings they may be tested and evaluated in accordance with appendix 2 of this part.

3 Additional requirements

3.1 The integrity of class "B" constructions shall be achieved with non-combustible materials. Adhesives used in the construction of the specimen are not required to be non-combustible; however, for the purpose of this Code, they shall have low flame-spread characteristics.

3.2 Materials placed at "B" class panel joints for avoiding vibration or noise transmission shall be of low flame spread characteristics and fire tested with "B" class divisions along which they are used. However, such materials shall be non-combustible if they are necessary to support the non-combustible "B" class structure or to achieve the required integrity.

3.3 Doors and shutters, which are fitted above the bulkhead deck and which are required to meet both fire protection and watertight requirements, shall comply with the fire protection requirements as required in the Convention, for the divisions where they are installed. The watertight doors fitted below the bulkhead deck are not required to be insulated.

4 Other references

4.1 The non-combustibility of materials used in "A" and "B" class divisions shall be verified in accordance with part 1.

4.2 Where combustible veneers are allowed to be provided in "A" and "B" class divisions, the low flame spread characteristics of such veneers, if required, shall be verified in accordance with part 5.

Interpretation

1 Methods of evaluation and testing

For sliding and hinged fire doors (in the following called “fire doors”) larger than those which can be accommodated in the standard specimen size (2,440 mm wide and 2,500 mm high), as specified in part 3 of the FTP Code,

1. if such doors can be accommodated into a larger test furnace, it is recommended to conduct a test with the full size specimen of the door; or

2. it is recommended to use the following method for evaluation of the fire performance of the door and approval of the door may be used.

2 Fire doors of marginally larger dimensions

2.1 A fire door of marginally larger dimensions than a fire door tested in accordance with the FTP Code may be individually assessed and accepted for a specific project with the same classification, provided all of the following are met:

1. dimensions (width, height) are not more than 15% above those of the fire door tested in accordance with the FTP Code;

2. the surface area of the door is not more than 10% above that of the fire door tested in accordance with the FTP Code;

3. the door design does not deviate in any other aspect from the fire door tested in accordance with the FTP Code; and

4. the tested door has successfully satisfied both insulation and integrity criteria for the following times, as appropriate:

"B-0"	0 min insulation	36 min integrity
"B-15"	18 min insulation	36 min integrity
"A-0"	0 min insulation	68 min integrity
"A-15"	18 min insulation	68 min integrity
"A-30"	36 min insulation	68 min integrity
"A-60"	68 min insulation	68 min integrity.

3 Fire doors larger than those in section 2 above, but not exceeding 50% in surface area of a fire door tested in accordance with the FTP Code

3.1 An engineering assessment can be used to extrapolate the fire test results of a fire door tested in accordance with the FTP Code to apply to a door larger than those in section 2 above, but not exceeding 50% in surface area of a fire door tested in accordance with the FTP Code.

3.2 Such an assessment can be accepted for verification, only if the dimensions of the door in question are greater than the maximum permitted by the IMO furnace and the results from tested door have been found satisfactory in accordance with section 1 above.

3.3 The methodology used to extrapolate the fire tests results shall include the following three steps:

1. standard fire test of the "specimen" to obtain reference temperature and structural displacements. Such a "specimen" may be either:

   1.1 a door already certified through the fire test which is identical in design to the door to be analysed (fire test to include additional instrumentation as per paragraph 3.4.2; or

   1.2 a specially-built specimen where the finite element method is to be performed to extrapolate the results of a specimen for a door having a size exceeding the maximum size allowed by the furnace of the testing laboratory; the specimen should be a mock-up of the door in question, but having a size that fits in the furnace;

2. finite element analysis in paragraph 3.6, of the “specimen” to calibrate the thermal and mechanical boundary conditions of the FEM model, which are adjusted until the numerical and experimental temperature and displacement distribution compare satisfactorily; and

3. finite element analysis in paragraph 3.5, of the door in question carried out using the model calibrated as per paragraph 3.7, assuming that the differences in the geometry and dimensions between the actual door and the specimen door do not significantly influence the results.

3.4 Data to be submitted

3.4.1 In order for the analysis to be carried out, the following information should be submitted:

1. detailed drawings of the door, the door frame and the closure and locking devices including clearances and interferences;

2. test report of the prototype used to extrapolate the results.

In this respect, additional instrumentation should consist of two sets of three 1.6 mm diameter thermocouples fitted through the thickness of the leaf, at depths of 1/3t, 1/2t, 2/3t. Such sets should be fitted, on the upper part of the door, within a circle of 100 mm in diameter whose centre is 150 mm aside of the surface thermocouples fitted in the centre of the top quarters;

3. mechanical characteristics of all materials used for the construction of the door and its insulation:

    3.1 young’s module;
    3.2 yield strength; and
    3.3 density; and

4. thermal properties:

    4.1 thermal expansion coefficient;
    4.2 thermal conductivity; and
    4.3 specific heat.

3.4.2 Since the properties in sections 3.4.1.3 and 3.4.1.4 are temperature dependent, it is necessary that the required data be given as a function of the temperature range foreseen for the fire tests. Where it is not possible to obtain experimental data, an engineering evaluation shall be submitted with the supporting documentation for the proposed curves of variation of mechanical and thermal characteristics as a function of the temperature in the considered range.

3.5 Method of analysis

The comparison of the fire resistance of doors having larger geometry shall be carried out in two steps:

1. evaluation of the heat transmission through the specimen thickness and of the temperature on the unexposed specimen surface; and

2. evaluation of the strength characteristics and of the displacements of the structural members of the specimen.

3.6 Heat transmission analysis

3.6.1 By carrying out finite element calculations, the histories over time of the heat transmission within the structural assembly are computed and the temperature is compared with the temperature experienced by the assembly represented in the standard fire test.

3.6.2 Based on suitable data for the temperature-dependent variables, an iterative procedure is used for the evaluation of thermal-mechanic properties.

3.6.3 The thermal boundary conditions of convecting and radiative type are:

$q_c = h_c (T_s – T_\infty)$

and

$q_r = \sigma_\varepsilon(T_s^4 – T_\infty^4)$

where:

q_c and q_r: Convective and radiative heat flux, respectively
h_c: Convective heat transfer coefficient
σ: Stefan-Boltzmann constant
ε: Emissivity coefficient
T_s: Surface temperature
T_∞: Furnace or ambient temperature.

3.6.4 The two equations can be included in an equivalent boundary condition:

$q = H_{eq} (\sigma, \varepsilon, T_s, T_\infty) (T_s – T_\infty)$

where:
the equivalent coefficient H_{eq} depends on the unknown surface temperature. However, it can be calculated as part of the finite element analysis using an emissivity coefficient appropriately calibrated with the fire test results.

3.6.5 The equivalent heat transfer coefficient can be assumed to be constant on the single exposed surface, as the furnace assembly built in accordance with the FTP Code gives uniformity of the temperature and heat flux within the furnace.

3.6.6 Alternatively, the temperature distribution measured on the specimen of the standard fire test can be directly applied on the finite element structural model taking into account the same time histories.

3.7 Structural analysis

3.7.1 Using the results of the heat transmission analysis and information on temperature-dependent material properties, the thermal stresses and deformations on the geometry are evaluated. When modelling the structural assembly, attention should be paid to using a sufficient number of elements to account for the non-uniform temperature distribution within the member and to catch the non-linear temperature-dependent behaviour.

3.7.2 Once the model is prepared, the analysis is to be carried out stepwise. For each element, the incremental strain or deformation caused by a temperature increase is calculated and a new stress level is obtained based on the stress-strain relationship applicable for that particular temperature increase.

3.7.3 The mechanical boundary conditions are to be congruent in order to represent the real interaction of the door with the external frame for the overall length of the test.

4 Larger fire doors exceeding 50% in surface area of a fire door tested in accordance with the FTP Code

4.1 For larger doors exceeding 50% in surface area of a fire door tested in accordance with the FTP Code, a full analysis is to be performed as per SOLAS regulation II-2/17.

4.2 The approach shall be based on the results of the fire test of the door having the maximum dimensions permitted by the IMO furnace according to the procedure described under section 3.

TL- I FTP 4 Fire resistant windows on tankers (Appendix A.I to resolution A.754(18))

Regulation

Paragraph 2.2 of Appendix A.I to resolution A.754(18) reads:

2.2 Design

The bulkhead which includes the window should be insulated to class A-60 on the stiffened face, which should be the face exposed to the heating conditions of the test. This is considered to be most typical of the use of windows on board ships, not necessarily being the worst way around. There may be special applications of windows where the Administration considers it appropriate to test the window with the insulation of the bulkhead to the unexposed face of the structural core, or within bulkheads other than class A-60.

The window should be positioned within the bulkhead, shown in figure 1 of the resolution, at that height which is intended for practical application. When this is not known, the window should be positioned with the top of its frame as close as possible, but not closer than 300 mm, to the top of the bulkhead.

Interpretation

Windows to be fitted at the forward bulkhead of accommodation block on tankers shall correspond to prototype subject to the “A” class standard fire test with the fire against its external side (i.e. the side which, after the installation on board, will be exposed to the weather). The insulation of the bulkhead used along with the window’s specimen shall be fitted on the unexposed face of the structural core.

(MSC.1/Circ.1203)

Note:
This Interpretation is editorially amended to refer to MSC.1/Circ.1203.

TL- I FTP 5 Testing and approval of “A” class divisions – fastening of insulation material and details of joints (IMO Res. A.754(18) / IMO FTP Code Part 3)

Regulation

IMO Res. A.754(18) item 1.6 / IMO FTP Code Part 3 Appendix 1 item 1.12 reads:

“The construction to be tested should be, as far as possible, representative of that to be used on board ships, including the materials and method of assembly”.

IMO Res. A.754(18) item 7.5.1 / IMO FTP Code Part 3 Appendix 1 item 7.6.1 reads:

“Thermocouples shall be placed over all types of joints, both vertical and horizontal, and also at intersections between the joints”.

Interpretation

To demonstrate that the tested “A” class assemblies are representative of that used on board ships, the following details shall, as a minimum when applicable, be clearly indicated in test reports and included in type approvals:

- Type, thickness, density and number of layers of insulation material;
- Size, types, materials and fixing methods of pins and washers;
- Spacing between pins;
- Maximum spacing between pins and adjacent joints;
- Stepping of joints for multi-layers if applicable;
- Insulation and pinning details on and around stiffeners;
- Details of wire mesh, alu tape etc, if used in the test;
- The type approval test report shall contain the information required by 2.1.3, 2.2.3, 6.1 and 10.4 of resolution A.754(18);
- Type approval certificate shall refer to drawing numbers of the test sample.

Note:

This interpretation is implemented for approvals issued in accordance with IMO FTPC Part 3 from 1 July 2011.

TL- I FTP 6 Testing and approval of pipe penetrations and cable transits for use in “A” class divisions (IMO FTP Code 2010 Annex 1 Part 3)

Regulation

IMO FTP Code 2010 Annex 1 Part 3 Appendix 1 item 1.13 reads:

The designs of the specimens proposed in this appendix are considered to reflect the worst case situations in order to provide maximum usefulness of the classifications to end-use applications. However, the Administration may accept or request special test arrangements which provide additional information required for approval, especially of those types of constructions which do not utilize the conventional components of horizontal and vertical divisions, e.g., where cabins may be of a modular type construction involving continuous connections between bulkheads, decks and ceilings.

Interpretation

Arrangement

“A”-class pipe penetrations and cable transits that are

a) constructed without structural sleeves of minimum 3 mm thickness and minimum 60 mm length welded or bolted to the division; and/or

b) constructed with removable, soft or intumescent filling material

are *“those types of constructions which do not utilize conventional components of horizontal and vertical divisions”* and are to be subject to additional testing and/or design criteria as described below:

Additional testing/design criteria

- Filling materials shall be adequately secured by bonded materials or mechanical means that cannot be removed without the use of tools in order to prevent damage by normal ship vibrations and pressures.

- The pipe penetration/cable transit shall not have any visible openings. It shall not be possible to manually penetrate any part of the penetration with a 6 mm gap gauge, as described in paragraph 7.10 of Appendix 1 of Part 3 to Annex 1 of the 2010 FTP Code.

NOTE

This Interpretation is implemented for approvals granted on or after 1 January 2016.

Approval

Penetrations in structural divisions shall not impair the structural strength of the division. The structural make-up of the penetration is to be fully described so that its use and the need for additional stiffening for the division can be fully assessed.