



CERTIFICATE OF FIRE APPROVAL

This is to certify that

The product(s) detailed below will be accepted for compliance with the applicable Lloyd's Register Rules and Regulations for use on offshore installations classed with Lloyd's Register, and for use on offshore installations when authorised by contracting governments to issue the relevant certificates, licences, permits etc.

Manufacturer	Carboline Company
Address	350 Hanley Industrial Court Brentwood Missouri 63144 United States of America (USA)
Type	STRUCTURAL STEEL HYDROCARBON FIRE PROTECTION SYSTEM
Equipment Description	Structural Steel Protection System I-Sections - Type: "THERMO-LAG 3000" reinforced with high temperature fabric mesh
Specified Standard	As defined by the UK Department of Energy Hydrocarbon Time/Temperature Relationship (The Hydrocarbon Fire Resistance Test for Elements of Construction of Offshore Installations: Test Specification - Issue 1 January 1990)

The attached Design Appraisal Document forms part of this certificate.

This certificate remains valid unless cancelled or revoked, provided the conditions in the attached Design Appraisal Document are complied with and the equipment remains satisfactory in service.

Date of issue 15 May 2018 Expiry date 14 May 2023

Certificate No. SAS F180209 Signed  

Sheet No 1 of 12 Name B. Geary
Surveyor to Lloyd's Register EMEA
A Member of the Lloyd's Register Group

Note:

This certificate is not valid for equipment, the design or manufacture of which has been varied or modified from the specimen tested. The manufacturer should notify Lloyd's Register of any modification or changes to the equipment in order to obtain a valid Certificate.

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Lloyd's
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This Design Appraisal Document forms part of the Certificate.

APPROVAL DOCUMENTATION

Omega Point Laboratories, Texas, United States of America, Project Nos. 15521-103050/103051/103052, dated 25 August 1998.

CONDITIONS OF CERTIFICATION

1. The minimum application thickness of "Thermo-Lag 3000" for Steel I-Sections are given in the Appendices 1 to 10 attached to this certificate
2. Application in each case to be approved by Lloyd's Register at the design stage
3. For use in external locations only, where personnel are not normally present
4. Use in internal locations may be considered for limited applications in modules or spaces not normally manned
5. "Thermo-Lag 3000" epoxy intumescent coating system must be reinforced with "high temperature fabric" mesh. Minimum fabric mesh overlaps for hydrocarbon fires: 50mm. Minimum practicable field application thickness 3mm
6. Production items are to be manufactured in accordance with a quality control system which shall be maintained to ensure that items are of the same standard as the approved prototype

PLACE OF PRODUCTION

Carboline Company
900 Opelousas
P.O. Box 3712
Lake Charles, LA 70601
United States of America (USA)

Carboline Co.
95 Airpark Vista Blvd
Dayton, Nevada 89403
United States of America (USA)



Ben Geary
Technical Manager
Statutory Fire & Safety
Southampton Technical Support Office, Marine & Offshore
Lloyd's Register EMEA

Supplementary Type Approval Terms and Conditions

This certificate and Design Appraisal Document relates to type approval, it certifies that the prototype(s) of the product(s) referred to herein has/have been found to meet the applicable design criteria for the use specified herein, it does not mean or imply approval for any other use, nor approval of any products designed or manufactured otherwise than in strict conformity with the said prototype(s).



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Appendix 1

Minimum coating thickness (mm) of "THERMO-LAG 3000" reinforced with high temperature fabric mesh applied to a structural I-Section member necessary to restrict the temperature of steel core to 300°C within the specified time period, in minutes as a function of the cross sectional area and shape of the structural element, represented by H_p/A value.

Where: H_p is the perimeter of the cross section element exposed to the fire (m)
and
 A is the cross sectional area of the element (m²)

H_p/A	TIME (Minutes)				
	60	90	120	150	180
30	3	4	6	8	10
35	3	5	7	9	11
40	3	6	8	10	12
45	4	6	8	11	13
50	4	6	9	12	14
55	4	7	10	12	15
60	4	7	10	13	16
65	5	8	11	14	17
70	5	8	11	14	18
75	5	8	12	15	18
80	5	9	12	16	19
85	5	9	13	16	20
90	6	9	13	17	20
95	6	10	13	17	21
100	6	10	14	18	22
110	6	10	14	19	23
120	6	11	15	19	24
130	7	11	16	20	24
140	7	11	16	21	25
150	7	12	17	21	26
160	7	12	17	22	27
170	7	12	17	22	27
180	8	13	18	23	28
190	8	13	18	23	29
200	8	13	18	24	29
210	8	13	19	24	30
220	8	14	19	24	30
230	8	14	19	25	30
240	8	14	20	25	31
250	8	14	20	25	31
260	8	14	20	26	32



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Appendix 2

Minimum coating thickness (mm) of "THERMO-LAG 3000" reinforced with high temperature fabric mesh applied to a structural I-Section member necessary to restrict the temperature of steel core to 350°C within the specified time period, in minutes as a function of the cross sectional area and shape of the structural element, represented by H_p/A value.

Where: H_p is the perimeter of the cross section element exposed to the fire (m)
and
 A is the cross sectional area of the element (m²)

H_p/A	TIME (Minutes)				
	60	90	120	150	180
30	3	3	5	7	8
35	3	4	6	7	9
40	3	4	6	8	10
45	3	5	7	9	11
50	3	5	7	10	12
55	3	5	8	10	13
60	3	6	8	11	14
65	3	6	9	12	14
70	3	6	9	12	15
75	4	7	10	13	16
80	4	7	10	13	16
85	4	7	10	14	17
90	4	7	11	14	17
95	4	8	11	14	18
100	4	8	11	15	18
110	4	8	12	16	19
120	5	9	12	16	20
130	5	9	13	17	21
140	5	9	13	18	22
150	5	9	14	18	22
160	5	10	14	19	23
170	5	10	15	19	24
180	6	10	15	19	24
190	6	10	15	20	25
200	6	11	15	20	25
210	6	11	16	21	26
220	6	11	16	21	26
230	6	11	16	21	26
240	6	11	16	22	27
250	6	11	17	22	27
260	6	12	17	22	27



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Appendix 3

Minimum coating thickness (mm) of "THERMO-LAG 3000" reinforced with high temperature fabric mesh applied to a structural I-Section member necessary to restrict the temperature of steel core to 400°C within the specified time period, in minutes as a function of the cross sectional area and shape of the structural element, represented by H_p/A value.

Where: H_p is the perimeter of the cross section element exposed to the fire (m)
and
 A is the cross sectional area of the element (m²)

H_p/A	TIME (Minutes)				
	60	90	120	150	180
30	3	3	4	5	7
35	3	3	5	6	8
40	3	3	5	7	9
45	3	4	6	8	9
50	3	4	6	8	10
55	3	4	6	9	11
60	3	5	7	9	12
65	3	5	7	10	12
70	3	5	8	10	13
75	3	5	8	11	13
80	3	6	8	11	14
85	3	6	9	12	14
90	3	6	9	12	15
95	3	6	9	12	15
100	3	6	10	13	16
110	3	7	10	13	17
120	3	7	11	14	18
130	4	7	11	15	18
140	4	8	11	15	19
150	4	8	12	16	20
160	4	8	12	16	20
170	4	8	12	17	21
180	4	8	13	17	21
190	4	9	13	17	22
200	4	9	13	18	22
210	4	9	14	18	23
220	4	9	14	19	23
230	5	9	14	19	24
240	5	9	14	19	24
250	5	10	15	19	24
260	5	10	15	20	25



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Appendix 4

Minimum coating thickness (mm) of "THERMO-LAG 3000" reinforced with high temperature fabric mesh applied to a structural I-Section member necessary to restrict the temperature of steel core to 450°C within the specified time period, in minutes as a function of the cross sectional area and shape of the structural element, represented by H_p/A value.

Where: H_p is the perimeter of the cross section element exposed to the fire (m)
and
 A is the cross sectional area of the element (m²)

H_p/A	TIME (Minutes)				
	60	90	120	150	180
30	3	3	3	5	6
35	3	3	4	5	7
40	3	3	4	6	7
45	3	3	5	6	8
50	3	3	5	7	9
55	3	3	5	7	9
60	3	4	6	8	10
65	3	4	6	8	11
70	3	4	6	9	11
75	3	4	7	9	12
80	3	4	7	10	12
85	3	5	7	10	13
90	3	5	8	10	13
95	3	5	8	11	14
100	3	5	8	11	14
110	3	5	9	12	15
120	3	6	9	12	16
130	3	6	9	13	16
140	3	6	10	13	17
150	3	6	10	14	18
160	3	7	10	14	18
170	3	7	11	15	19
180	3	7	11	15	19
190	3	7	11	16	20
200	3	7	12	16	20
210	3	8	12	16	21
220	3	8	12	17	21
230	3	8	12	17	21
240	3	8	13	17	22
250	3	8	13	17	22
260	3	8	13	18	22



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Appendix 5

Minimum coating thickness (mm) of "THERMO-LAG 3000" reinforced with high temperature fabric mesh applied to a structural I-Section member necessary to restrict the temperature of steel core to 500°C within the specified time period, in minutes as a function of the cross sectional area and shape of the structural element, represented by H_p/A value.

Where: H_p is the perimeter of the cross section element exposed to the fire (m)
and
 A is the cross sectional area of the element (m²)

H_p/A	TIME (Minutes)				
	60	90	120	150	180
30	3	3	3	4	5
35	3	3	3	4	6
40	3	3	4	5	6
45	3	3	4	5	7
50	3	3	4	6	8
55	3	3	5	6	8
60	3	3	5	7	9
65	3	3	5	7	9
70	3	3	5	8	10
75	3	3	6	8	10
80	3	4	6	8	11
85	3	4	6	9	11
90	3	4	6	9	12
95	3	4	7	9	12
100	3	4	7	10	12
110	3	4	7	10	13
120	3	5	8	11	14
130	3	5	8	11	15
140	3	5	8	12	15
150	3	5	9	12	16
160	3	5	9	13	16
170	3	6	9	13	17
180	3	6	10	13	17
190	3	6	10	14	18
200	3	6	10	14	18
210	3	6	10	15	19
220	3	6	11	15	19
230	3	6	11	15	19
240	3	7	11	15	20
250	3	7	11	16	20
260	3	7	11	16	20



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Appendix 6

Minimum coating thickness (mm) of "THERMO-LAG 3000" reinforced with high temperature fabric mesh applied to a structural I-Section member necessary to restrict the temperature of steel core to 538°C within the specified time period, in minutes as a function of the cross sectional area and shape of the structural element, represented by H_p/A value.

Where: H_p is the perimeter of the cross section element exposed to the fire (m)
and
 A is the cross sectional area of the element (m²)

H_p/A	TIME (Minutes)				
	60	90	120	150	180
30	3	3	3	4	5
35	3	3	3	4	5
40	3	3	3	4	6
45	3	3	3	5	6
50	3	3	4	5	7
55	3	3	4	6	7
60	3	3	4	6	8
65	3	3	5	6	8
70	3	3	5	7	9
75	3	3	5	7	9
80	3	3	5	8	10
85	3	3	6	8	10
90	3	3	6	8	11
95	3	3	6	8	11
100	3	4	6	9	11
110	3	4	7	9	12
120	3	4	7	10	13
130	3	4	7	10	13
140	3	4	8	11	14
150	3	4	8	11	15
160	3	5	8	12	15
170	3	5	8	12	16
180	3	5	9	12	16
190	3	5	9	13	16
200	3	5	9	13	17
210	3	5	9	13	17
220	3	5	9	14	18
230	3	6	10	14	18
240	3	6	10	14	18
250	3	6	10	14	19
260	3	6	10	15	19



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Appendix 7

Minimum coating thickness (mm) of "THERMO-LAG 3000" reinforced with high temperature fabric mesh applied to a structural I-Section member necessary to restrict the temperature of steel core to 550°C within the specified time period, in minutes as a function of the cross sectional area and shape of the structural element, represented by H_p/A value.

Where: H_p is the perimeter of the cross section element exposed to the fire (m)
and
 A is the cross sectional area of the element (m²)

H_p/A	TIME (Minutes)				
	60	90	120	150	180
30	3	3	3	3	4
35	3	3	3	4	5
40	3	3	3	4	6
45	3	3	3	5	6
50	3	3	4	5	7
55	3	3	4	6	7
60	3	3	4	6	8
65	3	3	4	6	8
70	3	3	5	7	9
75	3	3	5	7	9
80	3	3	5	7	10
85	3	3	5	8	10
90	3	3	6	8	10
95	3	3	6	8	11
100	3	3	6	8	11
110	3	4	6	9	12
120	3	4	7	10	12
130	3	4	7	10	13
140	3	4	7	10	14
150	3	4	8	11	14
160	3	4	8	11	15
170	3	5	8	12	15
180	3	5	8	12	16
190	3	5	9	12	16
200	3	5	9	13	16
210	3	5	9	13	17
220	3	5	9	13	17
230	3	5	9	13	18
240	3	5	10	14	18
250	3	5	10	14	18
260	3	6	10	14	18



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Appendix 8

Minimum coating thickness (mm) of "THERMO-LAG 3000" reinforced with high temperature fabric mesh applied to a structural I-Section member necessary to restrict the temperature of steel core to 600°C within the specified time period, in minutes as a function of the cross sectional area and shape of the structural element, represented by H_p/A value.

Where: H_p is the perimeter of the cross section element exposed to the fire (m)
and
 A is the cross sectional area of the element (m²)

H_p/A	TIME (Minutes)				
	60	90	120	150	180
30	3	3	3	3	4
35	3	3	3	3	5
40	3	3	3	4	5
45	3	3	3	4	6
50	3	3	3	5	6
55	3	3	3	5	6
60	3	3	3	5	7
65	3	3	4	6	7
70	3	3	4	6	8
75	3	3	4	6	8
80	3	3	4	6	9
85	3	3	4	7	9
90	3	3	5	7	9
95	3	3	5	7	10
100	3	3	5	7	10
110	3	3	5	8	11
120	3	3	6	8	11
130	3	3	6	9	12
140	3	3	6	9	12
150	3	3	6	10	13
160	3	3	7	10	13
170	3	3	7	10	14
180	3	3	7	11	14
190	3	4	7	11	14
200	3	4	7	11	15
210	3	4	8	11	15
220	3	4	8	12	15
230	3	4	8	12	16
240	3	4	8	12	16
250	3	4	8	12	16
260	3	4	8	12	17



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Appendix 9

Minimum coating thickness (mm) of "THERMO-LAG 3000" reinforced with high temperature fabric mesh applied to a structural I-Section member necessary to restrict the temperature of steel core to 650°C within the specified time period, in minutes as a function of the cross sectional area and shape of the structural element, represented by H_p/A value.

Where: H_p is the perimeter of the cross section element exposed to the fire (m)
and
 A is the cross sectional area of the element (m²)

H_p/A	TIME (Minutes)				
	60	90	120	150	180
30	3	3	3	3	4
35	3	3	3	3	4
40	3	3	3	3	4
45	3	3	3	4	5
50	3	3	3	4	5
55	3	3	3	4	6
60	3	3	3	4	6
65	3	3	3	5	7
70	3	3	3	5	7
75	3	3	3	5	7
80	3	3	3	5	8
85	3	3	3	6	8
90	3	3	3	6	8
95	3	3	4	6	9
100	3	3	4	6	9
110	3	3	4	7	10
120	3	3	4	7	10
130	3	3	4	8	11
140	3	3	5	8	11
150	3	3	5	8	12
160	3	3	5	9	12
170	3	3	5	9	12
180	3	3	5	9	13
190	3	3	5	9	13
200	3	3	6	10	14
210	3	3	6	10	14
220	3	3	6	10	14
230	3	3	6	10	14
240	3	3	6	10	15
250	3	3	6	11	15
260	3	3	6	11	15



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Appendix 10

Minimum coating thickness (mm) of "THERMO-LAG 3000" reinforced with high temperature fabric mesh applied to a structural I-Section member necessary to restrict the temperature of steel core to 700°C within the specified time period, in minutes as a function of the cross sectional area and shape of the structural element, represented by H_p/A value.

Where: H_p is the perimeter of the cross section element exposed to the fire (m)
and
 A is the cross sectional area of the element (m²)

H_p/A	TIME (Minutes)				
	60	90	120	150	180
30	3	3	3	3	3
35	3	3	3	3	4
40	3	3	3	3	4
45	3	3	3	3	4
50	3	3	3	3	5
55	3	3	3	3	5
60	3	3	3	4	6
65	3	3	3	4	6
70	3	3	3	4	6
75	3	3	3	4	7
80	3	3	3	5	7
85	3	3	3	5	7
90	3	3	3	5	7
95	3	3	3	5	8
100	3	3	3	5	8
110	3	3	3	6	9
120	3	3	3	6	9
130	3	3	3	6	10
140	3	3	3	7	10
150	3	3	4	7	10
160	3	3	4	7	11
170	3	3	4	8	11
180	3	3	4	8	12
190	3	3	4	8	12
200	3	3	4	8	12
210	3	3	4	8	13
220	3	3	4	9	13
230	3	3	5	9	13
240	3	3	5	9	13
250	3	3	5	9	14
260	3	3	5	9	14