اللجنة السعودية للإعتماد
Saudi Accreditation Committee
SAC
TESTING LABORATORY - 22 N \1427

BVSATS
شركة بيرو فيريتاس العربية السعودية لخدمات الإختبار
Bureau Veritas Saudi Arabia Testing Services

Electrical Laboratory – Test Report

Cable Tray Systems

Test report N°	E-17-02172
Date of issue	17-02-2018
Sample reception date	12-12-2017
Date of performance	01-02-2018
Applicant	الهيئة السعودية للمواصفات والمقاييس والجودة
Address of applicant	الرياض
Customer	Habbal Alarabi Factory
Address of customer	Jeddah
Applicant / Customer reference	Applicant email
Applicant / Customer date	11-12-2017
Sample description	Cable Tray
Trade mark / Manufacturer	HEMCO
Model / Style number / Type	HEMCO-BS-300-50-2440-1.4
Previous report number (if re-test)	-
Additional information	Dimensions# L: 2440mm, W: 300mm, H: 50mm
Test method(s)	SASO IEC 61537/2007*

Overall result Satisfactory ☑

Unsatisfactory

* See page 3 for detailed scope of test.

Possible test case results

- Test case does not apply to the test object ..... N/A
- Test case does meet the requirement ..... P (Pass)
- Test case does not meet the requirement ..... F (Fail)

General product information

Sample under test

Marking of sample

Remarks

- *" See enclosure ## "* refers to additional information related to this report in the annexes section
- *" See table ## "* refers to a table appended to this report in the annexes section
- *" See figure ## "* refers to an image, picture or drawing appended to this report in the annexes section
- Throughout this report, a point is used as decimal separator
- Mechanical properties (safety working load) test was performed at the manufacturer premises on sample provided by manufacturer.
- All the tests were done as per the information provided by the customer.

18/02/2018

Asst. Lab. Manager / Unit Supervisor
(Signature / Date)

Laboratory Manager
(Signature / Date)

Summary of tests

Standard	Clause	Clause description	Verdict
SASO IEC 61537	6	Classification(1)	P
SASO IEC 61537	7	Marking and documentation(1)	P
SASO IEC 61537	8	Dimension(1)	P
SASO IEC 61537	9	Construction(1)	P
SASO IEC 61537	10	Mechanical properties	P
SASO IEC 61537	10.2.1.1	SWL test procedure with Minimum temperature test	P
SASO IEC 61537	10.2.1.2	SWL test procedure with Maximum temperature test for temperatures <60°C	P
SASO IEC 61537	10.3	Test for SWL of cable tray lengths and cable ladder lengths mounted in the horizontal plane running horizontally on multiple spans	P
SASO IEC 61537	10.4	Test for SWL of cable tray lengths and cable ladder lengths mounted in the horizontal plane running horizontally on a single span installation	P
SASO IEC 61537	10.5	Test for SWL of cable tray lengths and cable ladder lengths mounted in the vertical plane running horizontally	N/A
SASO IEC 61537	10.6	Test for SWL of cable tray lengths and cable ladder lengths mounted in the vertical plane running vertically	N/A
SASO IEC 61537	10.7	Test for SWL of cable tray fittings and cable ladder fittings mounted in the horizontal plane running horizontally	N/A
SASO IEC 61537	10.9	Impact test(1)	P
SASO IEC 61537	11	Electrical properties(1)	P
SASO IEC 61537	13	Fire hazards(1)	N/A
SASO IEC 61537	14	External influences(1)	P
Tests accredited by: (1) SAC – (2) GAC – (3) SAC & GAC			

Test report details

Clause	Requirement	Result / Remark	Verdict
6	**Classification**	See below	P
6.1	**According to material**	See below	P
6.1.1	Metallic system component	Metallic system	P
6.1.2	Non-metallic system component		N/A
6.1.3	Composite system component		N/A
6.2	**According to resistance to flame propagation**	See below	P
6.2.1	Flame propagating system component		N/A
6.2.2	Non-flame propagating system component	Non flame propagating	P
6.3	**According to electrical continuity characteristics**	See below	P
6.3.1	Cable tray system or cable ladder system without electrical continuity characteristics		N/A
6.3.2	Cable tray system or cable ladder system with electrical continuity characteristics	With electrical continuity characteristic	P
6.4	**According to electrical conductivity**	See below	P
6.4.1	Electrically conductive system component	Electrically conductive	P
6.4.2	Electrically non-conductive system component		N/A
6.5	**According to resistance against corrosion**	See below	P
	If system components within the cable tray system or cable ladder system have different classifications, then the manufacturer or responsible vendor shall declare all relevant classifications.		N/A
	Within this clause, only normal atmospheric conditions are considered; special local environmental conditions are not considered in this standard.	Normal atmospheric conditions	P
6.6	**According to temperature**	See below	P
6.6.1	Minimum temperature for the system component as given in Table 2	0 °C (As declared by manufacturer)	P
6.6.2	Maximum temperature for the system component as given in Table 3	50 °C (As declared by manufacturer)	P
6.7	**According to the perforation in the base area of the cable tray length as given in Table 4**	Provided	P
6.8	**According to the free base area of cable ladder length as given in Table 5**	Cable tray	N/A
6.9	**According to impact resistance**	See below	P
6.9.1	System component offering impact resistance up to 2 J		N/A
6.9.2	System component offering impact resistance up to 5 J	5J	P
6.9.3	System component offering impact resistance up to 10 J		N/A

Test report details

Clause	Requirement	Result / Remark	Verdict
6.9.4	System component offering impact resistance up to 20 J		N/A
6.9.5	System component offering impact resistance up to 50 J		N/A
7	**Marking and documentation**	See below	P
7.1	Each system component shall be durably and legibly marked with.	Durably marked	P
	The manufacturer's or responsible vendor's name or trade mark or identification mark;	HEMCO	P
	A product identification mark which may be, for example, a catalogue number, a symbol, or the like.	HEMCO-BS-300-50-2440-1.4	P
	Compliance is checked by inspection and, for marking on the product, by rubbing by hand for15 s with a piece of cotton cloth soaked with water and again for 15 s with a piece of cotton cloth soaked with petroleum spirit.	Engraved marking	N/A
	After the test, the marking shall be legible.	Engraved markings are durable and legible	P
7.2	The manufacturer or responsible vendor shall declare the precautions and the alternative temperature limits.		P
7.3	The manufacturer or responsible vendor shall provide in his literature all information necessary for the proper and safe installation and use of the cable tray system and cable ladder system. The information shall include.	Instructions manual is provided and it contains adequate instructions	P
a	Instructions for the assembly and installation of system components and for the precautions.	Mentioned in the documentations	P
b	Thermal expansion properties and precautions to be taken, if necessary,	Mentioned in the documentations	P
c	Classification according to Clause 6,	Mentioned in the documentations	P
d	Relative humidity if it affects the classifications.		N/A
e	Information on holes or devices when provided for equipotential bonding in particular when a specific electrical connection device is necessary,	Mentioned in the documentations	P
f	Precautions for transport and storage outside the declared temperature classification, where applicable	0- 50°C	P
g	Product dimensions		P
h	Torque settings in Nm for screwed connections and internal fixing devices as well as threads, where applicable	Mentioned in the documentations	P
i	End span limitations	Mentioned in the documentations	P
j	Position and type of coupling along the span.	Mentioned in the documentations	P
k	SWL in N/m for the fittings when not directly supported and the distance Y from the supports adjacent to the fittings.		N/A
l	Fixing method for installing cable tray or cable ladder to the supports when declared for the test.		N/A
m	SWL in N/m for the cable tray lengths or cable ladder lengths.	SWL: 26.64kg/m	P
n	SWL in N for cantilever brackets and if used for cable tray only.		N/A

Test report details

Clause	Requirement	Result / Remark	Verdict
o	SWL for pendants as a bending moment in Nm and/or as a force in N.		N/A
p	The appropriate material specification and environmental conditions, chemical environments or aggressive agents for which the product is suitable.		P
8	**Dimensions**	See below	P
	The manufacturer or responsible vendor shall give the following information:	See below	P
	The overall envelope of the cross-section of the cable tray length or cable ladder length;	Marked: 704mm, Measured: 704mm.	P
	The width of the base area of cable tray length or cable ladder length;	Marked: 300mm, Measured: 300mm.	P
	The height of the cable tray length or cable ladder length.	Marked: 50mm, Measured: 50mm.	P
	The minimum internal radius of fittings available for the accommodation of cables;		N/A
	The dimensions of the perforations, and their arrangements on the cable tray lengths;	Marked: L: 25mm, W: 7mm, Measured: L: 25mm, W: 7mm.	P
	The dimensions of the rungs including perforations, if any, and the centre line spacing of the rungs.	Cable Tray	N/A
9	**Construction**	See below	P
9.1	Surfaces of system components which are likely to come into contact with cables during Installation or use shall not cause damage to the cables.		P
9.2	Where the manufacturer or responsible vendor does not declare the use of gloves for Installation purposes, then the surfaces of system components shall be safe for handling.		P
9.3	Screwed connections and other internal fixing devices shall be so designed to withstand the mechanical stresses.		P
9.3.1	- 10 times for metal screwed connections in engagement with a thread of non-metallic material and for screwed connections of non-metallic material, - 5 times in all other cases.	05 Times	P
	The test is carried out using a suitable screwdriver or spanner to apply the torque as specified by the manufacturer or responsible vendor		P
	After the test, there shall be no breakage or damage, that will impair the further use of the screwed connection.	No damage observed	P
9.3.2	Reusable connections other than screwed connections, for example push-on and clamping connections, shall be tightened and removed 10 times.		N/A
	After the test, there shall be no damage to impair the further use of the reusable connections.		N/A
9.3.3	Non-reusable connections are checked by inspection and, if necessary, by manual test.		N/A
9.4	Any apparatus mounting device shall meet the requirement of the appropriate standard.		N/A
9.5	Cable tray lengths, when perforated, shall exhibit a regular perforation pattern over the base area.	Regular perforation pattern observed	P

Test report details

Clause	Requirement	Result / Remark	Verdict
9.6	Cable ladder lengths shall exhibit a regular rung pattern over the base area.	Cable Tray	N/A
10	**Mechanical properties**	See below	P
10.1	**Mechanical strength**	See tables 1 & 2	P
	Cable tray systems and cable ladder systems shall provide adequate mechanical strength.	Adequate mechanical strength provided	P
	For the declared application, the manufacturer or responsible vendor shall declare the SWL to be tested.	As declared by manufacturer SWL = 26.64kg/m	P
10.2	**SWL test procedure**	See below	P
10.2.1.1	Minimum temperature	See table 2	P
	The test shall be carried out at maximum temperature declared according to the classification of Table 3. During this test, the uniformity of the temperature shall be maintained within the tolerance of ± 5° C, 0,25 m around the samples.	Test was done at 0.5°C (Minimum temperature as per manufacturer declaration: 0°C)	P
	The mounted sample shall be conditioned for a minimum of 2 h at the maximum temperature before loading.	> 02hrs	P
	All loads shall be uniformly distributed over the length and width of the sample.	Loads were uniformly distributed	P
	The load shall then be increased by increments or continuously on each sample through the load distribution plates, evenly longitudinally and transversely up to the SWL. Increments shall not be heavier than a quarter of the SWL	See table 2	P
	After loading, the deflection shall be measured at the points specified for each test arrangement.	See table 2	P
	Where visible transversal deformation occurs, a third measurement of deflection shall be taken in the centre of the cable tray base or cable ladder base at mid-span.	No Visible deformation	N/A
	The sample shall be left loaded and the deflections measured every 5 min ± 30 s until the difference between two consecutive sets of readings is less than 2 % with regard to the first set of the two consecutive sets of readings. The first set of readings measured at this point are the deflections measured at the SWL.		P
	The load on the sample shall then be increased to 1,7 times the SWL.	See table 2	P
	The sample shall be left and the deflections measured every 5 min ± 30 s until the difference between two consecutive sets of readings is less than 2 % with regard to the first set of the two consecutive sets of readings.		P
	The sample shall sustain the increased loading without collapsing. Buckling and deformation of the sample are permissible at this loading.	No collapsing occurred during test	P
10.2.1.2	Maximum temperature test for temperatures <60°C.	See table 1	P
	The test shall be carried out at maximum temperature declared according to the classification of Table 3.	Test was done at 33°C (Maximum temperature as per manufacturer declaration: 50°C)	P

Test report details

Clause	Requirement	Result / Remark	Verdict
	The mounted sample shall be conditioned for a minimum of 2 h at the maximum temperature before loading.	> 02hrs	P
	All loads shall be uniformly distributed over the length and width of the sample.	Loads were uniformly distributed	P
	The load shall then be increased by increments or continuously on each sample through the load distribution plates, evenly longitudinally and transversely up to the SWL. Increments shall not be heavier than a quarter of the SWL	See table 1	P
	After loading, the deflection shall be measured at the points specified for each test arrangement.	See table 1	P
	Where visible transversal deformation occurs, a third measurement of deflection shall be taken in the centre of the cable tray base or cable ladder base at mid-span.	No Visible deformation	N/A
	The sample shall be left loaded and the deflections measured every 5 min ± 30 s until the difference between two consecutive sets of readings is less than 2 % with regard to the first set of the two consecutive sets of readings. The first set of readings measured at this point are the deflections measured at the SWL.		P
	The load on the sample shall then be increased to 1,7 times the SWL.	See table 1	P
	The sample shall be left and the deflections measured every 5 min ± 30 s until the difference between two consecutive sets of readings is less than 2 % with regard to the first set of the two consecutive sets of readings.		P
	The sample shall sustain the increased loading without collapsing. Buckling and deformation of the sample is permissible at this loading.	No collapsing occurred during test	P
10.3	**Test for SWL of cable tray lengths and cable ladder lengths mounted in the horizontal plane running horizontally on multiple spans**	See below	P
	The test is carried out on cable tray lengths and joints or cable ladder lengths and joints to verify the declared SWL when mounted over multiple spans with the cable tray or cable ladder in the flat and horizontal plane.	See clause 10.2.1.2	P
	The test is carried out with the samples consisting of two or more cable tray lengths or cable ladder lengths.		P
	These shall be coupled, as shown in Figure 1 to form two full spans plus a cantilever.		P
	Joints are to be positioned as required for each test type following the manufacturer's or responsible vendor's instructions.		P
	The cantilever of 0,4L can be increased slightly in length as described in Annex D.		P
	Depending on the installation method(s) declared by the manufacturer or responsible vendor, one or more of the test types in accordance with 10.3.1 to 10.3.5 shall be used.	Considered to be Type I (As per customer declaration)	P
	The tests for 10.3.1 to 10.3.5 shall be carried out in accordance with 10.2	See clause 10.2.1.2	P
	The practical mid-span deflection of each span at the SWL shall not exceed 1/100th of the span.	See table 1 and 2	P

Test report details

Clause	Requirement	Result / Remark	Verdict
10.3.1	Test type I	See below	P
	Test type I shall be used when the manufacturer or responsible vendor does not declare any end span limitations and where the joints shall be placed on all installations.		P
	In this case, joints can occur anywhere on an installation. The test arrangement shall be as shown in Figure 2a.		P
10.4	**Test for SWL of cable tray lengths and cable ladder lengths mounted in the horizontal plane running horizontally on a single span installation**	See below	P
	The test is carried out on cable tray length(s) or cable ladder length(s) to verify the declared SWL when used as a single beam over a single span with the cable tray or cable ladder in the flat and horizontal plane.	See clause 10.2.1.2	P
	If the span is greater than the cable tray length or cable ladder length and the manufacturer or responsible vendor does not declare where the joint(s) shall be placed, they shall be at midspan position as shown in Figure 4.		P
	The test shall be carried out in accordance with 10.2.	See clause 10.2.1.2	P
	The practical mid-span deflection at the SWL shall not exceed 1/100th of the span.	See table 1 and 2	P
10.5	**Test for SWL of cable tray lengths and cable ladder lengths mounted in the vertical plane running horizontally**		N/A
10.6	**Test for SWL of cable tray lengths and cable ladder lengths mounted in the vertical plane running vertically**		N/A
10.7	**Test for SWL of cable tray fittings and cable ladder fittings mounted in the horizontal plane running horizontally**		N/A
10.9	**Test for impact resistance**	See below	P
	The test is carried out on samples of cable tray lengths or cable ladder lengths, 250 mm ± 5 mm long.		P
	Before the test, non-metallic and composite components are aged at a temperature of 60 °C ± 2 ° C for 168 h continuously	No such components	N/A
	The samples to be tested shall be placed in a refrigerator, the temperature within is maintained at the declared temperature according to Table 2, with a tolerance of ±2 °C	Test was done at 0 °C (as declared by the manufacturer)	P
	After a minimum of 2 h, the samples shall, in turn, be removed from the refrigerator and immediately placed in the test apparatus.	02 hrs.	P
	At 10 s ± 1 s after removal of each sample from the refrigerator, the hammer shall be allowed to fall with the declared impact energy.	Test was done at 5J (As declared by the manufacturer) Weight: 1.7kg Fall height: 300mm	P
	After the test, the samples shall show no signs of disintegration and/or deformation that impair safety.	No deformation occurred	P
11	**Electrical properties**	See below	P
11.1	**Electrical continuity**	See below	P

Test report details

Clause	Requirement	Result / Remark	Verdict
	Cable tray system and cable ladder system shall have adequate electrical continuity to ensure connection to earth.	Adequate electrical continuity provided	P
11.1.2	A current of 25 A ± 1 A a.c. having a frequency of 50 Hz to 60 Hz supplied by a source with a no-load voltage not exceeding 12 V shall be passed through the length of the samples.	25A at 60Hz	P
	The calculated impedances shall not exceed 50mΩ across the joint and 5 mΩ per meter without the joint.	With joint: 13.84mΩ Without joint: 2.79mΩ/m	P
11.2	**Electrical non-conductivity**	Electrically conductive samples	N/A
	Metal cable tray systems and metal cable ladder systems declared electrically nonconductive if having surface resistivity value of 100 MΩ or greater.		N/A
11.2.1	Preparation of samples		N/A
	For cable tray systems, prepare plate samples having a width of (25 ± 0,5) mm and a length of 50 mm.		N/A
	For cable ladder systems, prepare plate samples from the side rail having a width of (25 ± 0,5) mm and a length of 50 mm.		N/A
11.2.2	Preparation of electrodes		N/A
	shall be made of a suitable conductive material not subjected to corrosion under the conditions of the test and not reacting with the material being tested;		N/A
	shall have the dimensions: 10 mm x 10 mm x 50 mm.		N/A
11.2.3	Humidity treatment of samples		N/A
	The humidity treatment shall be carried out in a humidity cabinet with a relative humidity between 91 % and 95 % at a temperature t, maintained within ± 1C of any convenient value between 20°C and 30°C.		N/A
	The samples are kept in the humidity cabinet for 24 hrs.		N/A
11.2.4	Mounting of electrodes on samples		N/A
	The electrodes shall be mounted on the samples for measurement according to Figure 13. The electrodes shall be spaced (25 ±0,5) mm.		N/A
11.2.5	Measurement of surface resistance		N/A
	The samples shall be subjected to a d.c. voltage equal to (500 ±10) V for 1 min.		N/A
11.2.6	Calculation of surface resistivity		N/A
	The surface resistivity shall be calculated from the following formula: $\rho = R_x \times p/g$		N/A
13	**Fire hazards**	Metallic system	N/A
13.1.2	Contribution to fire		N/A

Test report details

Clause	Requirement	Result / Remark	Verdict
	Compliance is checked by the test according to IEC 60695-2-11:2000, Clauses 4 to 10, with a glow-wire temperature of 650 °C.		N/A
	The test is carried out applying the glow-wire once for30S		N/A
	The sample is regarded as having passed the glow-wire test if		N/A
	there is no visible flame and no substantial glowing,		N/A
	flames and glowing at the sample extinguish within 30 s after removal of the glow-wire.		N/A
	There shall be no ignition of the tissue paper or scorching of the board.		N/A
13.1.3	Spread of fire		N/A
	Non-flame propagating systems components shall either not ignite or, if ignited, shall have a limited spread of fire.		N/A
	The flame test is carried out on samples that have a length of 675 mm ± 10 mm.		N/A
	The burner is positioned as shown in Figure 10 with the flame applied		N/A
	to the middle of the side rail of the inside face of the cable ladder length, to the inside face at the junction between the base and the side flange of the cable tray length.		N/A
	The samples shall be subjected to the exposure of the flame for 60 s ± 2 s.		N/A
	The sample shall be regarded to have passed the test if		N/A
	it does not ignite, or if		N/A
	in the case of ignition, the following three conditions are fulfilled:		N/A
	a) the flame extinguishes within 30 s after removal of the test flame,		N/A
	b) there is no ignition of the tissue paper or scorching of the board,		N/A
	c) there is no evidence of burning or charring above 50 mm below the lower extremity of		N/A
14	**External influences**	See below	P
14.1	**Resistance against environmental forces**		N/A
	Snow, wind loading and other environmental forces are not considered to be the responsibility of the manufacturer or responsible vendor.		N/A
14.2	**Resistance against corrosion**	See below	P
	All system components shall have adequate resistance against corrosion in accordance with Table 7.	As declared in the certificate provided by the manufacturer	P

Test report annexes

Table 1: Safety working load for cable tray (With Joint) at maximum temperature (+33°C)

Dimension: 2440mm (L), 300mm (W), 50mm (H).

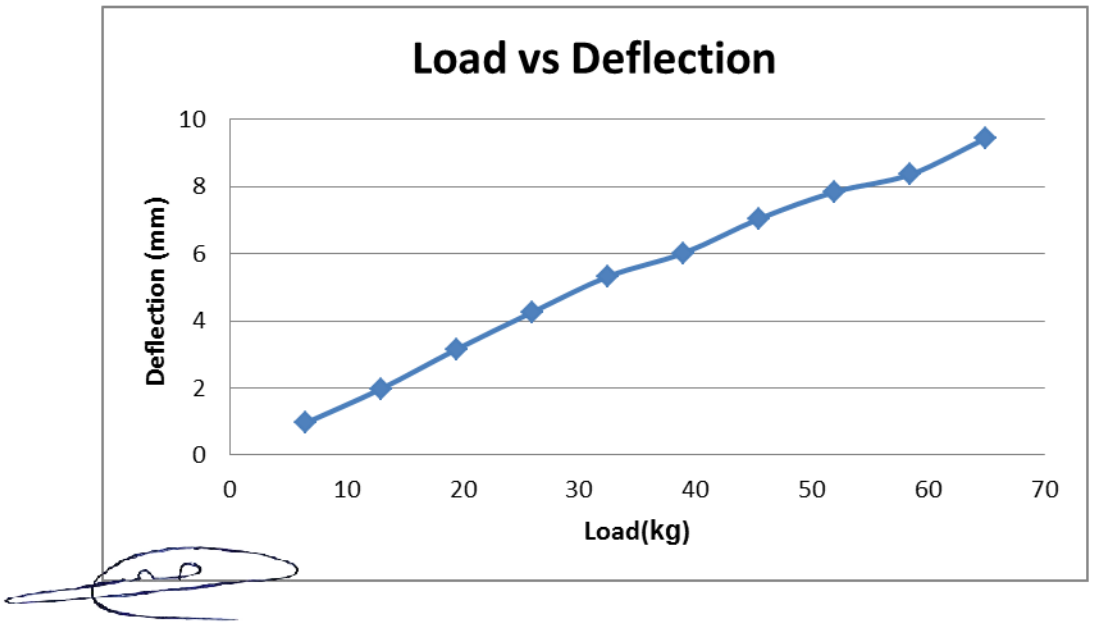
SWL= 26.64kg/m (As per manufacturer declaration).

SWL= 26.64kgX2.44m = 65kg.

Load (kg)	6.5	13	19.5	26	32.5	39	45.5	52	58.5	65	65kg X 1.7T = 110.5kg
Deflection (mm)	0.96	1.98	3.16	4.26	5.32	6.02	7.04	7.84	8.36	9.44	13.90 (No collapsed)

Mid-span deflection: 9.44mm at 65kg (Required: ≤ 24.4mm),

Transverse Deflection: 9.44mm at 65kg (Required: ≤ 15mm).



Graph between load and deflection at maximum temperature

Test report annexes

Table 2: Safety working load for cable tray (With Joint) at minimum temperature (0.5°C)

Dimension: 2440mm (L), 300mm (W), 50mm (H).

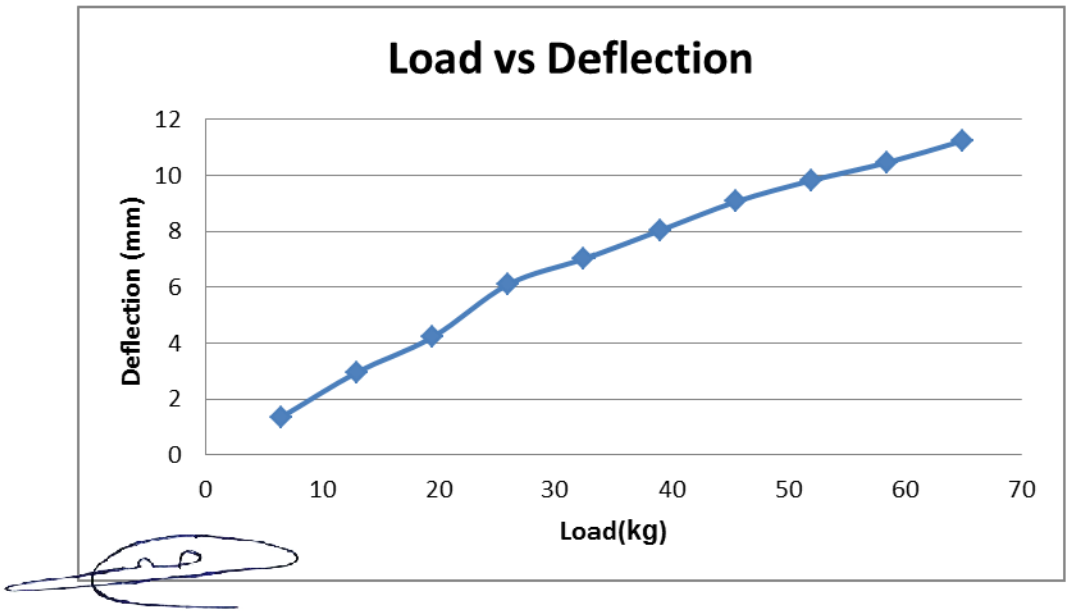
SWL= 26.64kg/m (As per manufacturer declaration).

SWL= 26.64kgX2.44m = 65kg.

Load (kg)	**6.5**	**13**	**19.5**	**26**	**32.5**	**39**	**45.5**	**52**	**58.5**	**65**	**65kg X 1.7T = 110.5kg**
Deflection (mm)	1.36	2.96	4.22	6.10	7.02	8.04	9.06	9.82	10.46	11.24	15.48 (No collapsed)

Mid-span deflection: 11.24mm at 65kg (Required: ≤ 24.4mm),

Transverse Deflection: 11.24mm at 65kg (Required: ≤ 15mm).



Graph between load and deflection at minimum temperature

Test report annexes

Sample under test