INTERNATIONAL UNION OF RAILWAYS

U I C CODE
Leaflet to be classified in Volumes :
IV - OPERATING
V - TRANSPORT STOCK
VIII - TECHNICAL SPECIFICATIONS

806 R

1st Edition, 1-7-1979

UDC : 006.44 : 621.796.8 :629.453.6

TECHNICAL SPECIFICATION FOR THE SUPPLY OF SHEETS FOR PROTECTING LOADS ON OPEN WAGONS

REVISIONS

Leaflet 806, 1st Edition, 1-7-79			
Amendment		Amendment	
No.	Date	No.	Date

CONTENTS

1 - PURPOSE

1.1 - Scope

1.2 - Reference documents

2 - CHARACTERISTICS

2.1 - Composition materials

2.1.1 - Physical characteristics

2.1.1.1 - Appearance

2.1.1.2 - Weight per unit surface

2.1.2 - Mechanical characteristics

2.1.2.1 - Tensile strength

2.1.2.2 - Resistance to tearing

2.1.3 - Physico-chemical characteristics

2.1.3.1 - Imperviousness to water

2.1.3.2 - Resistance to bending (or flexibility test)

2.1.3.3 - Resistance to bending at low temperature

2.1.3.4 - Reaction to fire

2.2 - Products

2.2.1 - Physical characteristics

2.2.1.1 - Appearance

2.2.2 - Geometrical characteristics

2.2.2.1 - Dimensions

2.2.2.2 - Spacing of eyelets

2.2.3 - Mechanical characteristics

2.2.3.1 - Resistance to tearing apart of the weld

2.2.3.2 - Resistance to pulling out of the eyelets, of the ring tabs and resistance to tearing of the hem

2.2.4 - Physico-chemical characteristics

2.2.4.1 - Imperviousness to water (on welded parts)

2.2.5 - Marks

2.2.5.1 - Marks on coated fabrics

2.2.5.2 - Marks on sheets

2.2.5.2.1 - Owner's marks

2.2.5.2.2 - Manufacturer's marks

2.2.5.2.3 - Fold marks

2.2.6 - Method of folding the sheets

3 - MANUFACTURE

3.1 - Preparation of the composition materials

3.2 - Manufacture of the sheets

3.2.1 - Assembly of the widths of coated fabric

3.2.2 - Hem round the sheets

3.2.3 - Eyelets and ring tabs

3.2.4 - Manufacture of accessories

3.2.5 - Repairs

4 - INSPECTION

4.1 Inspection of the fabrics and sheets

4.1.1 - Submission for acceptance

4.1.1.1 - Condition of the fabrics and sheets on submission

4.1.1.2 - Grouping into batches

4.1.1.3 - Advice for submission

4.1.2 - Nature and proportion of the checks and tests

4.1.3 - Selection and preparation of samples and test pieces

4.1.3.1 - Selection of samples

4.1.3.1.1 - Coated fabrics

4.1.3.1.2 - Sheets

4.1.3.2 - Selection and preparation of test pieces

4.1.4 - Carrying out of the checks and tests

4.1.4.1 - Coated fabrics

4.1.4.1.1 - Appearance

4.1.4.1.2 - Weight per unit surface

4.1.4.1.3 - Tensile strength

4.1.4.1.4 - Resistance to tearing

4.1.4.1.5 - Imperviousness to water

4.1.4.1.6 - Resistance to bending (flexibility test)

4.1.4.1.7 - Resistance to bending at low temperature

4.1.4.1.8 - Reaction to fire.

4.1.4.2 - Sheets

4.1.4.2.1 - Appearance and manufacture

4.1.4.2.2 - Dimensions

4.1.4.2.3 - Resistance to tearing of the weld

4.1.4.2.4 - Resistance to pulling out of the eyelets and ring tabs, and resistance to tearing of the hem

4.1.4.2.5 - Imperviousness to water (on welded parts)

4.2 Conclusion of the inspection

5 - DELIVERY

2 - CHARACTERISTICS

2.1 - Composition materials

The basic fabric shall be polyamide or polyester.

This fabric shall be coated with polyvinyl chloride (PVC).

2.1.1 - Physical characteristics

2.1.1.1 - Appearance

The weave should be even.

The coating must be spread evenly over both sides of the basic fabric. No part of the covering must be missing, there must be no bubbles or lumps, or apparent lack of adhesion of the covering on the basic fabric.

These provisions shall be checked in accordance with the indications in § 4.1.4.1.1 of this specification.

2.1.1.2 - Weight per unit surface

The coated fabrics to which this specification refers are classified in three categories of different maximum weights, which are indicated below :

- Category A : 600 g/m2

- Category B : 700 g/m2

- Category C : 750 g/m2

The weight shall be checked in accordance with the provisions of § 4.1.4.1.2 of this specification.

2.1.2 - Mechanical characteristics

2.1.2.1 - Tensile strength

The tensile strength of the fabrics (in both warp and weft directions) expressed by the minimum breaking force should be :

- Category A : 2250 N

- Category B : 2750 N

- Category C : 3500 N

The maximum elongation on failure (in both warp and weft directions) must be :

- Category A : 20 %

- Category B : 25 %

- Category C : 30 %

These provisions shall be checked in accordance with the indications of § 4.1.4.1.3 of this specification.

2.1.2.2 - Resistance to tearing

The resistance to tearing of the fabrics (warp and weft) expressed by the minimum tearing force must be :

- Standards :	BSI	DIN	AFNOR
- Category A :	350 N	200 N	100 N
- Category B	800 N	350 N	120 N
- Category C :	1200 N	500 N	140 N

These three groups of values correspond to the three standard methods of testing prescribed by the BSI, DIN and AFNOR standards.

This characteristic shall be checked in accordance with the provisions of § 4.1.4.1.4 of this specification.

2.1.3 - Physico-chemical characteristics

2.1.3.1 - Imperviousness to water

The fabrics must not show any seepage during each test.

These characteristics shall be checked in accordance with the provisions of § 4.1.4.1.5 of this specification.

2.1.3.2 - Resistance to bending (or flexibility test)

The fabrics must withstand a minimum of 1×10^6 deflections without the coating being damaged.

This characteristic shall be checked in accordance with the provisions of § 4.1.4.1.6 of this specification.

2.1.3.3 - Resistance to bending at low temperature

The fabrics subjected to this test must not show any hair line cracks, or cracks.

This stipulation shall be checked in accordance with the provisions of § 4.1.4.1.7 of this specification.

2.1.3.4 - Reaction to fire

The results of the tests carried out under the experimental conditions defined in § 4.1.4.1.8 of this specification must be in accordance with the stipulations of the purchasing Railway.

2.2 - Products

The sheets shall consist of assembled widths of coated fabrics.

2.2.1 - Physical characteristics

2.2.1.1 - Appearance

The sheets should have a uniform appearance. There shall be no stretching or puckering where the panels are joined, or at the edges of the sheets.

The checks shall be carried out as prescribed in § 4.1.4.2.1 of this specification.

2.2.2 - Geometrical characteristics

2.2.2.1 - Dimensions

Unless otherwise stated in the order or its appended documents, the sheets must be supplied with the following dimensions :

Nominal measurements (in mm) Width × length		
5000 × 8000	5500 × 10000	6000 × 15000

A tolerance of ± 500 mm (1) is applicable to all the nominal measurements (1).

(1) The relatively large tolerances are intended to encourage standardisation. After a certain period of application, they will be reduced as and when the possibility arises and, should the opportunity arise, completely eliminated.

2.2.2.2 - Spacing of eyelets

The distance between the eyelets centres is 800 mm. A tolerance of ± 300 mm (1) is allowed.

The checks shall be carried out as provided in § 4.1.4.2.2 of this specification.

2.2.3 - Mechanical characteristics

2.2.3.1 - Resistance to tearing apart of the weld

The resistance to tearing expressed by the minimun tearing force must be : 20 N/cm.

This characteristic shall be checked as provided in § 4.1.4.2.3 of this specification.

2.2.3.2 - Resistance to pulling out of the eyelets, of the ring tabs and resistance to tearing of the hem.

The resistance to pulling out and tearing must not be less than : 1500 N.

This characteristic shall be checked as provided in § 4.1.4.2.4 of this specification.

---

(1) The relatively large tolerances are intended to encourage standardisation. After a certain period of application, they will be reduced as and when the possibility arises and, should the opportunity arise, completely eliminated.

2.2.4 - Physico-chemical characteristics

2.2.4.1 - Imperviousness to water (on welded parts)

The welded parts of the sheets must not show any seepage durigg each test. The appearance of droplets shall be tolerated at certain points, provided they do not become detached.

These stipulations shall be checked in accordance with the provisions of §4.1.4.2.5 of this specification.

2.2.5 - Marks

2.2.5.1 - Marks on coated fabrics

Coated fabrics delivered in separate pieces must bear the following marks in indelible characters 75 mm high on the end of the outside roll :

- the manufacturer's identification mark,
- the length of the piece in metres,
- the date of manufacture (last two figures of the year).

2.2.5.2 - Marks on sheets

The sheets must bear the following marks :

- the owner's marks,
- the manufacturer's marks,
- the fold marks.

All marks must be affixed in a permanent manner by means of a small plate or a painted inscription. The method of applying them shall be left to the choice of the owning Railway.

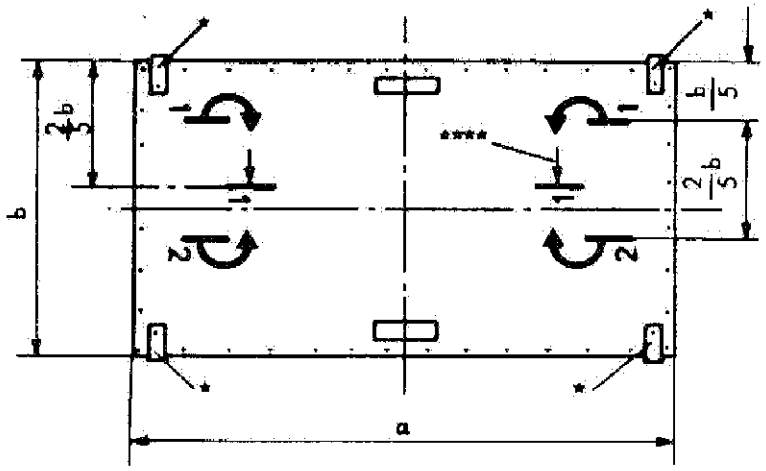

Fig. 1a : marking on the right side up

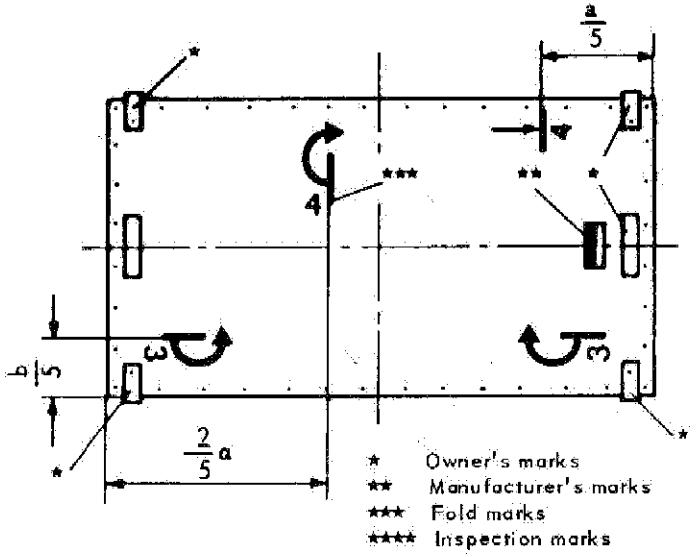

Fig. 1b : marking on the wrong side

2.2.5.2.1 - Owner's marks

These marks comprise :

- the mark of the owning Railway,
- the serial number of the sheet,
- the details of the usable area.

These marks must be placed :

- on the right side up : along the transverse centre line near the two longitudinal edges,
- on the wrong side : along the longitudinal centre line near the two transverse edges,
- on the rigth side up and/or the wrong side : at the 4 ends of the longitudinal edges.

2.2.5.2.2 - Manufacturer's marks

These marks comprise :

- the manufacturer's marks,
- the month and year of manufacture.

This marking must only appear once on the sheet and is best applied near the owner's marks.

2.2.5.2.3 - Fold marks

This marking comprises :

- the fold marks,
- the inspection marks.

The fold marks indicate the position of the folds on the sheet. The marking figure specifies the sequence number of the folding operations and the curved arrow indicates the direction of folding.

The inspectoin marks also indicate the position of the edges of the sheet after folding operations 1 and 4.

2.2.6 - Method of folding the sheets

The sheet is folded in four successive operations and is then rolled up and kept tight by means of fasteners which do not, however, form part of the sheet.

The sheet must be sufficiently taut before each folding operation.

1st fold : The sheet is folded lengthwise at the marks 1, by taking the outside edge as far as the reference marks 1 (Fig. 2) :

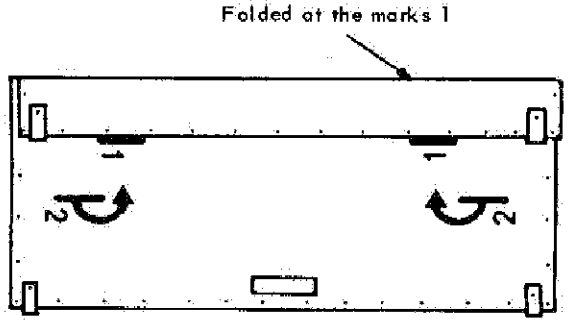

Fig. 2

2nd fold : A fresh fold is then effected, also lengthwise, at the marks 2, by drawing the other outside edge over the fold at the marks 1. The fold marks 3 now appear (Fig. 3) :

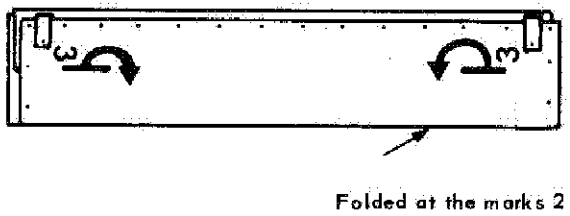

Fig. 3

3rd fold : Still in a lengthwise direction, the sheet is folded at the marks 3, by drawing back the fold at the marks 1 over the fold at the marks 2 which it covers, which causes the fold and reference marks 4 to appear (Fig. 4) :

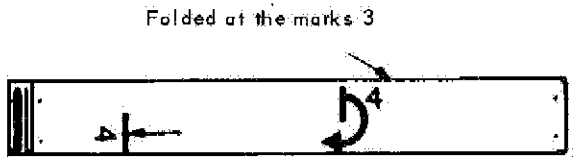

Fig. 4

4th fold : The sheet is folded breadthwise at the mark 4 as far as the reference mark 4 (Fig. 5) :

Fig. 5

Rolling : Beginning at the fold at mark 4 effected last, the sheet is rolled lengthwise (Fig. 6). When fully rolled, the marks of the owning Railway and of the manufacturer affixed on the wrong side in the middle of the transverse edge (Fig. 7) are visible.

The sheet is then kept tight by means of fasteners.

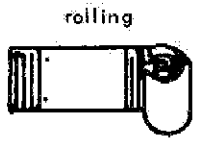

Fig. 6

Fig. 7

3 - MANUFACTURE

3.1 - Preparation of the composition materials

No specific condition is laid down for the preparation of the raw materials used in the manufacture of the coated fabrics (unless conditions are stipulated in the order or its appended documents), subject to the finished product satisfying the characteristics stipulated in this specification, or in the order or its appended documents.

3.2 - Manufacture of the sheets

3.2.1 - Assembly of the widths of coated fabric

The sheets shall be obtained from widths of coated fabric of the same category, consisting of a polyamide or polyester base coated on both sides, to the same extent, with PVC.

The widths of coated fabric shall be joined by high frequency welding. Other welding processes may be allowed subject to the agreement of the purchasing Railway. The minimum width of the welded joins must be 16 mm, and for welding widths together, the overlapping surfaces of the joins must be welded completely flat against each other.

To avoid bulges on the edges of the join, groove electrodes must be used.

3.2.2 - Hem round the sheets

Unless otherwise stated in the order or its appended documents, all the edges of the sheet must be folded twice to form a hem of 80 mm in width and three layers of fabric.

The two inner and outer edges of the hem thus formed must be welded (or sewn if the order or its appended documents prescribe sewing).

All corners must be closed by welding.

3.2.3 - Eyelets and ring tabs

Those parts of sheets in which eyelets or ring tabs have to be inserted must have a thickness of at least 4 layers of fabric.

Where necessary, a circular strengthening insert with a minimum diameter of 60 mm, of coated fabric identical to that used for manufacturing the sheet, may be welded on to the sheet by means of a cylindrical electrode.

3.2.4 - Manufacture of accessories

The ring tabs and the rings, manufactured in accordance with the provisions of the national standards of the purchasing Railway, must be fixed to the sheets by welding, failing specific provisions in the order.

3.2.5 - Repairs

Any repair intended to conceal a defect shall be prohibited.

4 - INSPECTION

4.1 - Inspection of the fabrics and sheets

4.1.1 - Submission for acceptance

4.1.1.1 - Condition of the fabrics and sheets on submission

The fabrics and sheets shall be submitted in delivery condition.

4.1.1.2 - Groupigg into batches

Coated fabrics from the same manufacture and included in the same submission for acceptance shall constitute a batch.

Sheets of the same size and category of fabric, manufactured at the same time and submitted for inspection together, shall constitute a batch.

4.1.1.3 - Advice of submission

When the order specifies that the supply shall be submitted for inspection at the place of manufacture, the purchasing Railway shall be notified, by a suitable document prepared by the supplier and signed by the factory manager or his representative, of :

- the date of submission,

- the references of the order,

- the composition of the batches submitted, specifying for each of them, the category of fabric and the nature and quantity of the fabrics or sheets submitted.

4.1.2 - Nature and proportion of the checks and tests

The coated fabrics and sheets shall be subjected to inspection of their characteristics as mentioned in Sections 2 and 3 of this specification.

Depending on the size of the batch, the number of series of tests to be carried out, unless otherwise specified in the order or its appended documents, is given below :

Size of the batch		Number of series of tests (or samples)
Coated fabrics (in metres)	Sheets (number)	
⩽ 5 000	⩽ 50	1
5 001 to 20 000	51 to 300	2
> 20 000	> 300	3

Each series of tests shall comprise the checks and tests indicated in the following table .

Nature of the checks and tests		Paragraph of the technical specification	Number of test pieces	Dimensions of the test pieces
Coated fabrics	Appearance	4.1.4.1.1	at the option of the representative of the purchasing Railway	the pieces of fabric themselves
	Weight per unit surface	4.1.4.1.2	3	50 mm × 50 mm
	Tensile strength - breaking force - elongation on failure	4.1.4.1.3	ISO/R 1421 5 warp 5 weft	50 mm × 300 mm
	Resistance to tearing	4.1.4.1.4	BS 3424 – Method 7 DIN 53 356 NF G 37-104 – Test C	
	Imperviousness to water	4.1.4.1.5	ISO/R 811 4	200 cm²
	Resistance to bending (flexibility test)	4.1.4.1.6	3 warp 2 weft	44 mm × 50 mm
	Resistance to bending at low temperature	4.1.4.1.7	DIN 53 361	
	Reaction to fire	4.1.4.1.8	standards of purchasing Railway	

Nature of the checks and tests		Paragraph of the technical specification	Number of test pieces	Dimensions of the test pieces
Sheets	Appearance - Manufacture	4.1.4.2.1	at the option of the representative of the purchasing Railway	the sheets themselves
	Dimensions	4.1.4.2.2		
	Resistance to tearing out of the weld	4.1.4.2.3	3	100 mm x 250 mm
	Resistance to pulling out of the eyelets, ring tabs and hem	4.1.4.2.4	3	100 mm x 300 mm
	Imperviousness to water (on welded parts)	4.1.4.2.5	ISO/R 811 4	200 cm²

4.1.3 - Selection and preparation of samples and test pieces

4.1.3.1 - Selection of samples

The pieces of fabric and the sheets from which the samples are cut for the checks and tests, shall be selected at random from each batch submitted.

The pieces of fabric and the sheets from which the samples are taken, also the samples themselves, must be marked indelibly for identification.

4.1.3.1.1 - Coated fabrics

From each piece of fabric chosen, a sample 1 m x 1.50 m which does not include a selvedge, shall be taken from a position at least 3 meters from one end without completely dividing the piece breadthwise. The warp and the weft shall be suitably marked.

4.1.3.1.2 - Sheets

From each sheet selected, a sample 0.7 m x 1.60 m including a welded part longitudinally, also a sufficient number of eyelets and ring tabs, shall be selected.

4.1.3.2 - Selection and preparation of the test pieces

The test pieces shall be selected and prepared in accordance with the method provided for each test.

When the preparation is not specified, ISO Recommendation 139-1973 must be applied.

4.1.4 - Carrying out of the checks and tests

4.1.4.1 - Coated fabrics

4.1.4.1.1 - Appearance

The appearance of the fabric, observed a short distance away from a window preferably facing the north, must conform to the provisions of § 2.1.1.1 of this specification.

4.1.4.1.2 - Weight per unit surface

The test pieces are dried until a reasonably constant weight is obtained, in an atmosphere with a relative humidity of not more than 10 %, and a temperature not exceeding 80°C (an oven maintained at a temperature between 50°C and 55°C must normally have an atmosphere with a relative humidity not exceeding 10 %).

The average of the results to be obtained is that indicated in § 2.1.1.2 of this specification.

4.1.4.1.3 - Tensile strength

The method of testing the strength and elongation at failure must conform to the provisions of ISO Recommendation 1421-1971.

The cut strip method shall be used.

The traction speed shall be constant and 100 mm/mn ± 10 mm/mn.

The preparation of the test pieces for at least 16 hours, also the tests, shall be carried out in an atmosphere at 65 % RH ± 2% RH and 20° C ± 2°C.

The results to be obtained are those those indicated in § 2.1.2.1 of this specification.

4.1.4.1.4 - Resistance to tearing

There are three usable methods for carrying out the tearing test, which are given in :

- British Standard : BS 3424 : 1973 - method 7
- German Standard : DIN 53 356
- French Standard : NF G 37-104 - Test C.

The results to be obtained are those indicated in § 2.1.2.2 of this specification.

4.1.4.1.5 - Imperviousness to water

The method of testing imperviousness to water must conform to the provisions of ISO Recommendation 811-1968.

The fabric test pieces shall be subjected to an instantaneous pressure of 20 kPa followed by a pressure of 10 kPa for 5 minutes.

The results to be obtained shall be those indicated in § 2.1.3.1 of this specification.

4.1.4.1.6 - Resistance to bending (flexibility test)

The apparatus (Schildkneche) machine) consists of one or more pairs of cylinders, set up so that the centre lines of each pair of cylindres are in alignment. The cylinders have an outside diameter of 25 mm and 1 cylinder of each pair is able to effect an alternating movement of 13 mm along its centre line at a rate of 500 cycles per minute. When a pair of cylinders is in the «open» position, the ends of each pair are 19 mm apart ; while in the «closed» position, this distance is 6 mm.

Clamping rings are provided to fix the test pieces to the cylinders.

The manufacture of the sheets and their fittings, also the method of fixing the latter, should conform to the provisions of § 3.2 of this specification.

4.1.4.2.2 - Dimensions

The dimensions of the sheets and the spacing of eyelets shall be measured by means of the usual instruments suited to their size.

The results to be obtained shall be those indicated in § 2.2.2.1 and 2.2.2.2 of this specification.

4.1.4.2.3 - Resistance to tearing of the weld

The method of testing, also the preparation before and during the tests, shall be those used and described in § 4.1.4.1.3. of this specification.

The longitudinal centre line of the test piece must coincide with that of the weld. The width of the weld is noted. The weld is notched at one end, leaving at least 180 mm of the welded part intact.

The separate ends of the test piece are fixed in the jaws of the test machine, and the machine is adjusted so that the tensile force is uniformly distributed.

The separation force over a length of 180 mm is recorded.

The average of the centre half of the graphs is noted.

The result to be obtained shall be that indicated in § 2.2.3.1 of this specification.

4.1.4.2.4 - Resistance to pulling out of the eyelets and ring tabs, and resistance to tearing of the hem.

The method of testing shall be that used and described in § 4.1.4.1.3 of this specification.

The width dimension of the test piece with a single thickness of fabric must be secured in the fixed jaw of the tensile machine, with the eyelet or the ring of the tab along the tensile axis. A hook suitably secured in the movable jaw must be placed in the eyelet or the ring of the tab.

The result to be obtained shall be that indicated in § 2.2.3.2 of this specification.

4.1.4.2.5 - Imperviousness to water (on welded parts)

The method of testing imperviousness to water on the welded parts must conform to the provisions of ISO Recommendation 811-1968.

The sheet test pieces shall be subjected to an instantaneous pressure of 20 kPa, followed by a pressure of 10 kPa for 5 minutes.

The results to be obtained shall be those indicated in § 2.2.4.1 of this specification.

4.2 - Conclusion of the inspection

Any result of a check or test which does not conform to the prescribed conditions may lead to rejection of the corresponding batch.

Fresh tests at the request of the supplier may only be carried out with the prior agreement of the purchasing Railway.

The representative of the purchasing Railway may, at his own discretion, select the sample for the check tests either from the article from which the original test pieces were selected, or from other articles forming part of the batch in question.

The check tests must be carried out in accordance with the provisions of this specification.

If only one of the test pieces of the check tests does not give results conforming to the provisions of this specification, the batch must be rejected.

5 - DELIVERY

The sheets shall be delivered folded and rolled in accordance with the provisions of § 2.2.6 of this specification.

APPLICATION

All Railways in the Union.

RECORD REFERENCES

Heading under which the question has been dealt with :

- *Question 5/SA/FIC* : Revision of UIC Leaflet 806 «Sheets for protecting loads on open wagons».

(Sub-Committee for Specifications : Paris, January 1979).