



## Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 12195 was prepared by Technical Committee ISO/TC 126, *Tobacco and tobacco products*, Subcommittee SC 2, *Leaf tobacco*.

Annex A forms an integral part of this International Standard. Annexes B to D are for information only.

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# Threshed tobacco — Determination of residual stem content

## 1 Scope

This International Standard specifies a method for the measurement of the stem content of strips of leaf tobacco.

It is applicable to strips arising from the operation of threshing or hand-stripping leaf tobacco, which can be from any tobacco type including flue-cured, burley and cigar tobacco.

The test method consists of taking a sample of tobacco strips and passing it through a stem tester.

## 2 Definitions

For the purposes of this International Standard, the following definitions apply.

**2.1 stem:** Main vein of a tobacco leaf.

**2.2 lamina:** Area between the veins of a tobacco leaf.

**2.3 strips:** Long pieces of threshed or stripped lamina.

**2.4 threshing:** Removal of the stem and side veins of tobacco leaves by mechanical means.

**2.5 stripping:** Removal of the stem from tobacco leaves, leaving the halves of the leaf more or less intact.

**2.6 stem tester:** Small-scale thresher and separating tower which threshes and classifies the residual stem from the lamina in a controlled manner.

**2.7 stacked sieve-type shaker:** Shaker which reproduces the circular and tapping motion given to test screens in sieving in a uniform manner.

## 3 Apparatus

### 3.1 Stem tester

The main operating features of the stem tester are given in 3.1.1 to 3.1.11, and are illustrated in figure 1.

#### 3.1.1 Static pressure tapping apparatus and manometer

The tapping apparatus shall be fitted 254 mm above the flange, immediately above the doors of the separating tower and as flush as possible to the internal wall. This is to avoid air turbulence and thus erratic readings. The static tapping apparatus is illustrated in figure 2.

A suitable manometer with a full-scale range of at least 0 mmH<sub>2</sub>O to 5 mmH<sub>2</sub>O is fitted to the tapping apparatus and set to zero. It indicates the air velocity in the separating tower.

#### 3.1.2 Stem-deflector plates

Two stem-deflector plates are required to stop free stem and "heavies" being kicked out of the thresher and lost to the test. The first is fitted to the end of the vibratory conveyor feeding into the top of the thresher housing; the second is fitted to the base of the thresher (see figures 3 and 4).

Damper C sited at the air-flow inlet below the thresher shall be removed (see 3.1.8).

**3.1.3 Thresher**, having the following characteristics.

|                        |                            |
|------------------------|----------------------------|
| Rows of thresher teeth | 4                          |
| Teeth per row          | 31                         |
| Tooth dimensions       | 96,8 mm × 25,4 mm × 3,2 mm |
| Teeth spacing          | 3,2 mm                     |

See figure B.1 and table B.1 for more details.

**3.1.4 Thresher basket**, having the following characteristics.

|                   |                              |
|-------------------|------------------------------|
| Hole size         | 19 mm diameter punched holes |
| Hole distribution | see figure B.2               |
| Basket size       | 479,3 mm × 263,5 mm × 3,2 mm |
| Outside radius    | 154 mm                       |

See figure B.2 and table B.2 for more details.

**3.1.5 Shaft**

Shaft speeds shall be as follows.

|  |                    |
|--|--------------------|
| Thresher                                   | (1 150 ± 20) r/min |
| Vibratory conveyor bearing                 | (450 ± 20) r/min   |
| Winnower                                   | (950 ± 20) r/min   |
| Both tangential separator rotary air locks | (70 ± 5) r/min     |

**3.1.6 Tobacco-strip conveyor**, having the following characteristics.

|                      |                            |
|----------------------|----------------------------|
| Dimensions           | 2 438 mm × 457 mm × 152 mm |
| Cycle time           | 4 min                      |
| Sample delivery time | 160 s                      |
| Belt speed           | 914 mm/min                 |

**3.1.7 Air-inlet vanes**

The vanes shall be fixed securely in the following positions.

|             |                       |
|-------------|-----------------------|
| Top vane    | 34° to the horizontal |
| Middle vane | 34° to the horizontal |
| Bottom vane | 29° to the horizontal |

**3.1.8 Dampers**, having the following settings and uses.

**Damper A** is sited downstream of the 14/24 tangential "lights" separator and is used to adjust the air flow through the separating tower.

**Damper B** is sited downstream of the 14/18 tangential "heavies" separator and shall be kept in the wide-open position to prevent stems building up in the tangential separator.

**Damper C** is sited at the air-duct inlet below the thresher and shall be removed to prevent deposits of free stem and "heavies" building up behind the closed or partly closed damper; a stem deflector plate is fitted at the base of the thresher (see 3.1.2). If required, a large-mesh screen can be fitted to the end of the air duct to trap any foreign matter picked up by the air flow; if fitted, it shall be kept clean.

**Damper D** is sited in the air duct after the thresher and shall be kept closed.

See figure 5 for the positions of these dampers.

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**3.1.9 Separating tower**

The vibrating conveyor screen shall be of 20 mesh, wire diameter 0,36 mm, open area 51 %. The mesh is supported by a wire grid.

The vibrating conveyor screen shall have a 25,4 mm clearance at the point of exit from the separating tower to allow the "heavies" to pass through to the thresher.

The winnower selvedge shall clear the winnower housing by 6,4 mm to 9,5 mm.

**3.1.10 Fan**

The fan should be capable of providing an air-flow rate of over 119 m<sup>3</sup>/min at a pressure of 127 mmH<sub>2</sub>O, but its speed may need adjusting to compensate for changes in air density at higher altitudes.

**3.1.11 Discs**

Strips for different tobacco types can differ in their bulk density and therefore require different sample masses to ensure a constant volume feed through the stem tester. This avoids overloading the thresher and separating tower, which would lead to variable and erratic results.

Tobacco types can also differ in the air-flow rate required to separate the stem from the strips. The separating tower needs to be set up to a different standard air flow for these tobaccos.

The air-flow rates are standardized by means of plastic discs which are described more fully in annex C, clause C.1, and their design is shown in figure C.1.

The recommended sample mass disc specifications together with their tolerances for the three major tobacco types are detailed in table 1.

**Table 1 — Tobacco sample size and disc mass**

| Tobacco tape | Sample mass<br>g | Disc mass<br>mg |        |
|--------------|------------------|-----------------|--------|
|              |                  | Light           | Heavy  |
| Flue-cured   | 3 000 ±300       | 328 ±4          | 420 ±4 |
| Burley       | 3 000 ±300       | 265 ±4          | 328 ±4 |
| Cigar        | 1 000 ±100       | 210 ±4          | 290 ±4 |

**3.2 Stacked sieve-type shaker, 200 mm in diameter<sup>1)</sup>**

The test method can be extended by taking the stem product collected from the stem tester (3.1) and, after weighing, screening it into various size classes by means of a sieve-type shaker.

The stacked sieve-type shaker shall have the following characteristics.

- Elliptical diameter                    32 mm × 25 mm approx.
- Frequency of shaking                280 r/min to 290 r/min
- Hammer drop                            33 mm ± 2 mm
- Frequency of striking                150 r/min to 157 r/min

All sieves shall be of the standard size 203,2 mm in diameter and 50,8 mm deep. They are designed to nest together to form a stable sieve stack in the following order:

- a) a 2,38 mm slotted-plate screen (made to order) (see figure 6),
- b) 280 mm sieve,
- c) 1,70 mm sieve,
- d) pan.

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1) An example of a suitable sieve shaker available commercially is the C.E. Tyler Ro-Tap, Mod. RH-19, Mod. B.

This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Equivalent equipment may be used if it can be shown to lead to the same results.

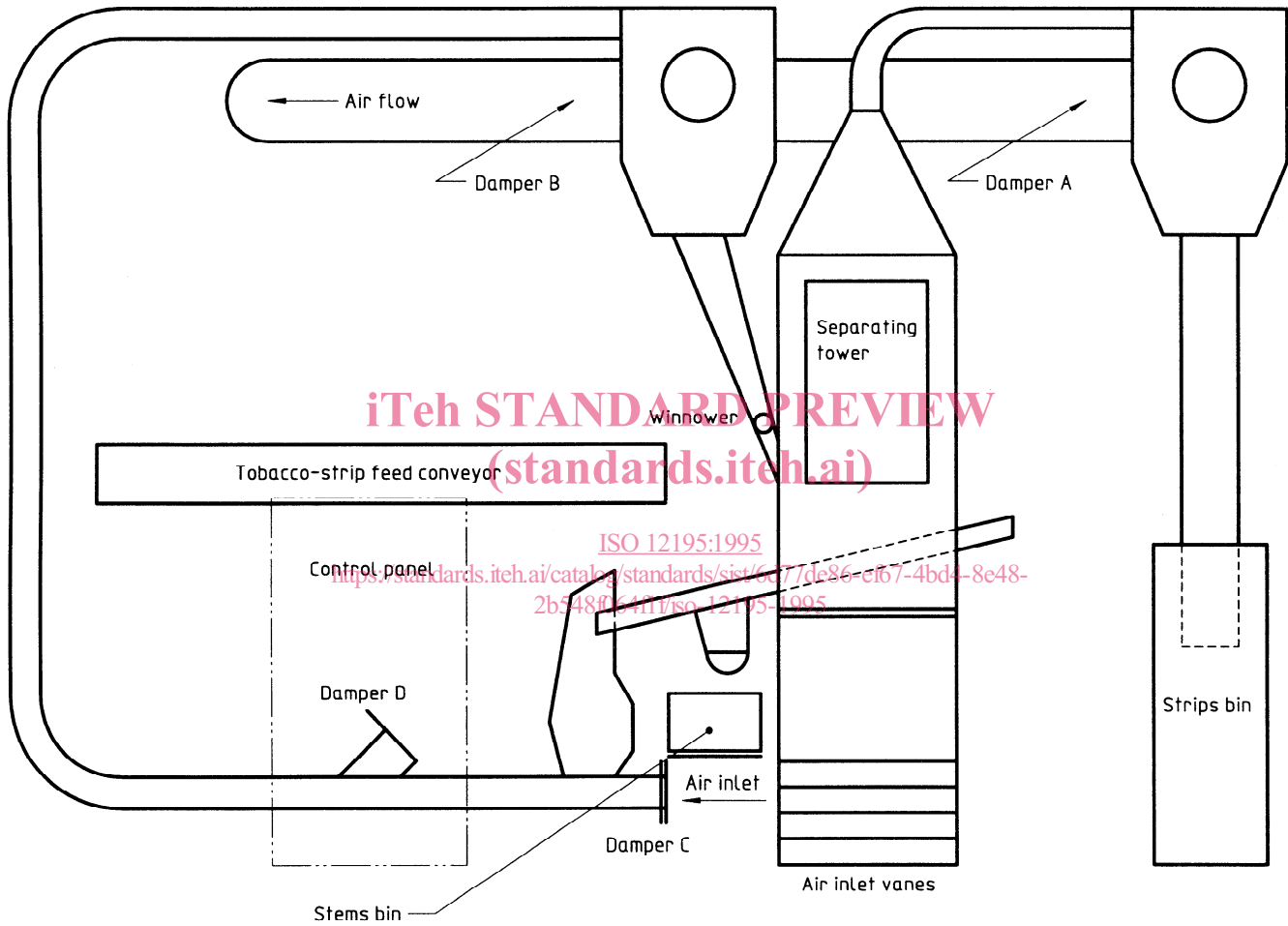


Figure 1 — Stem tester

Dimensions in millimetres

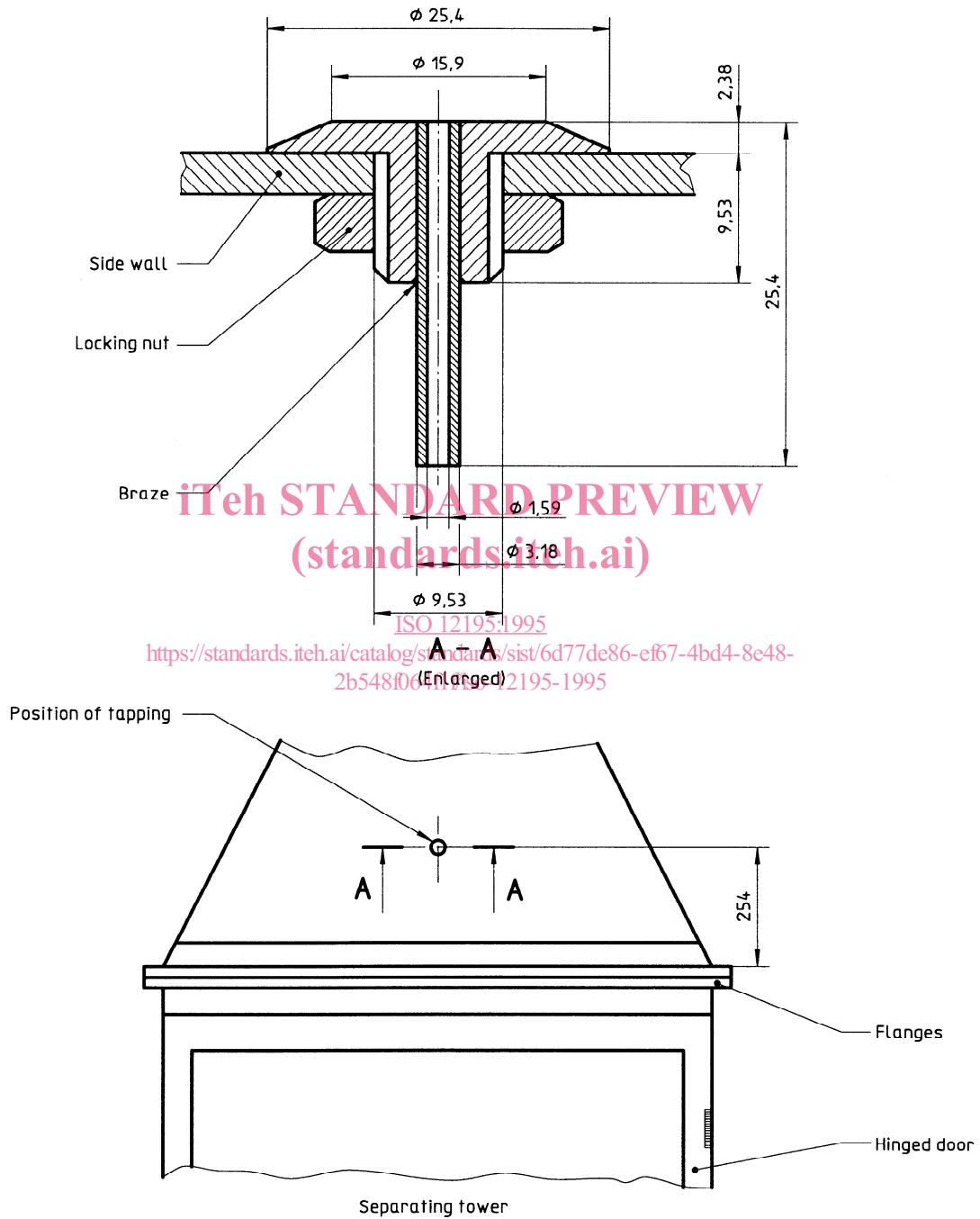
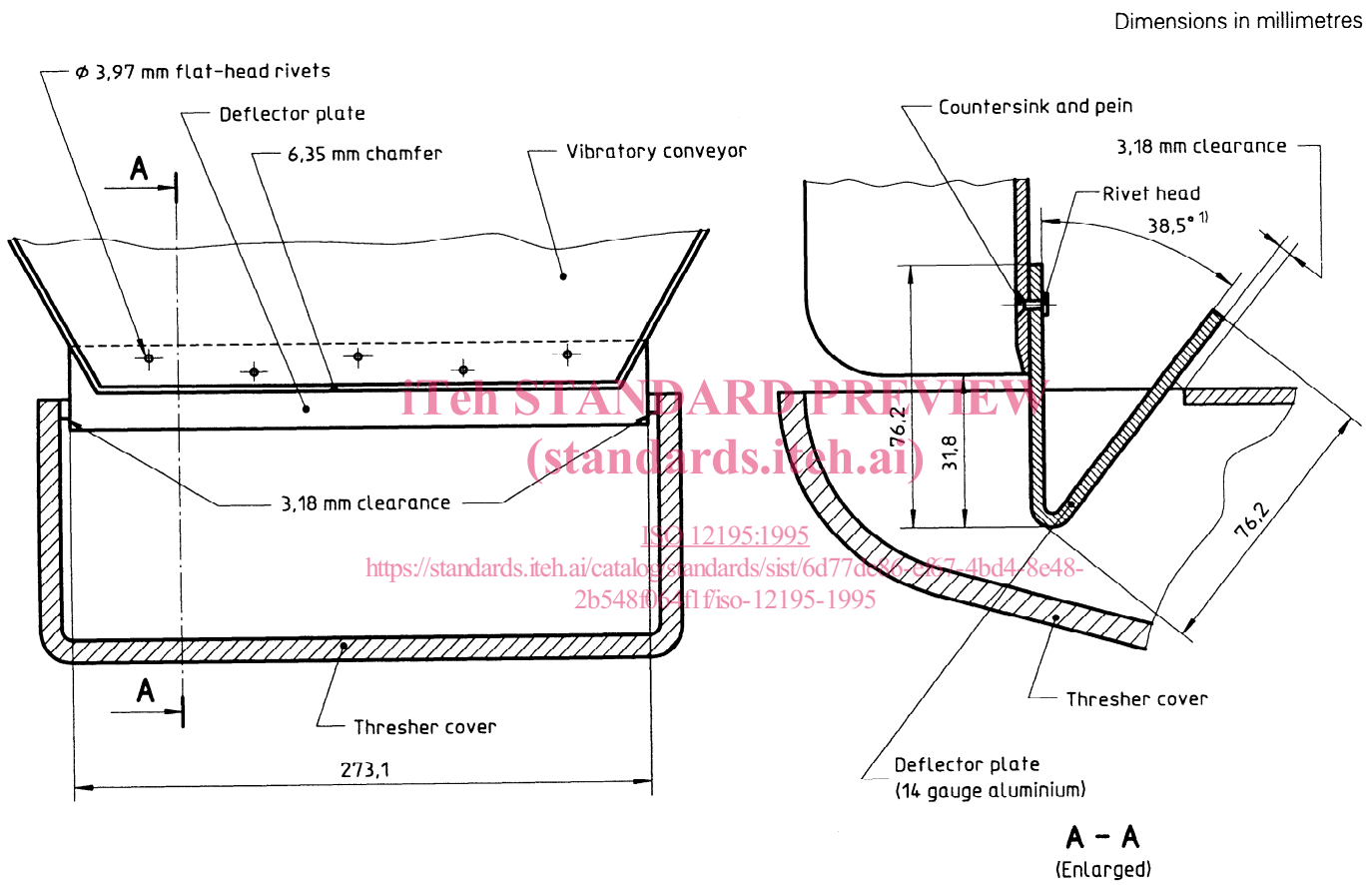


Figure 2 — Standard static-pressure tapping apparatus

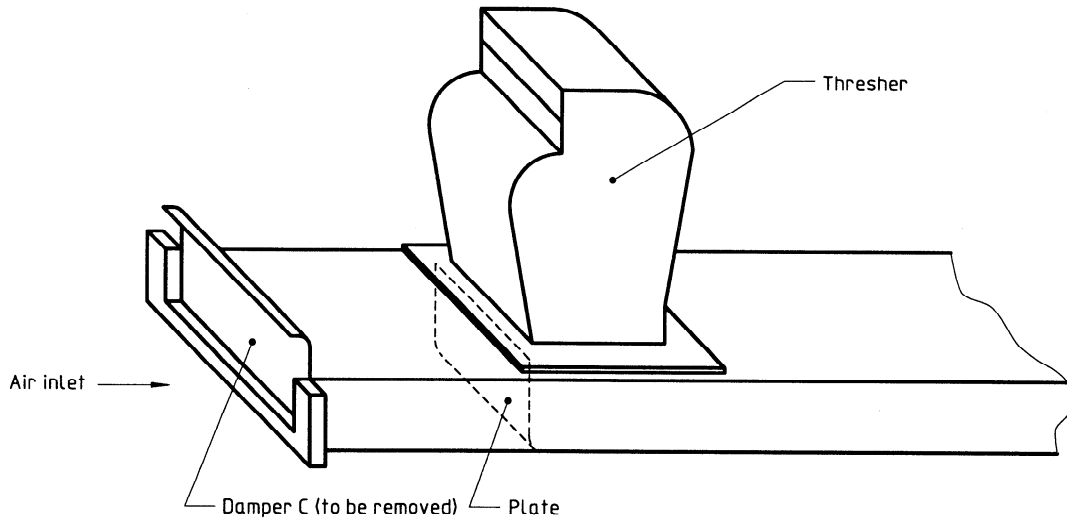


1) This angle may have to be changed to suit some machines.

**Figure 3 — Inlet of thresher stem-deflector plate**



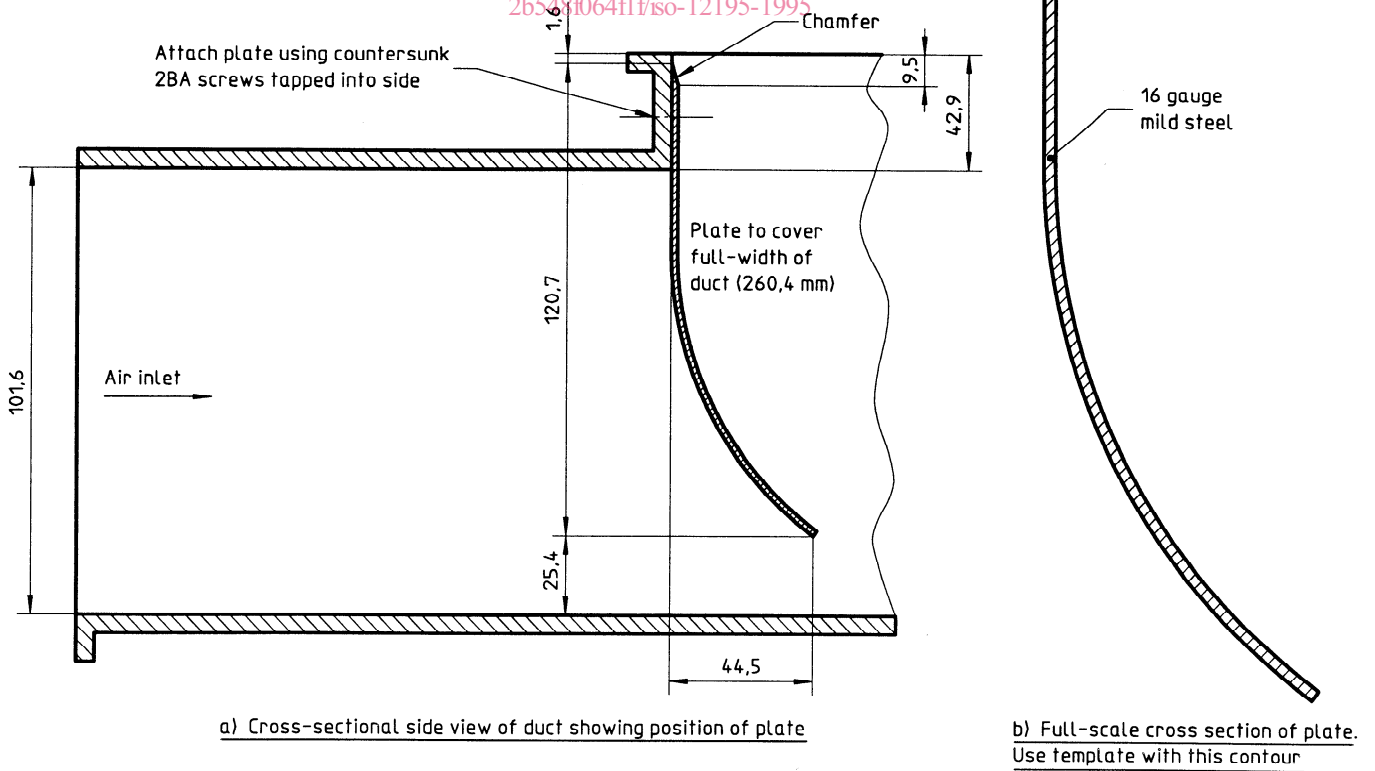
Dimensions in millimetres



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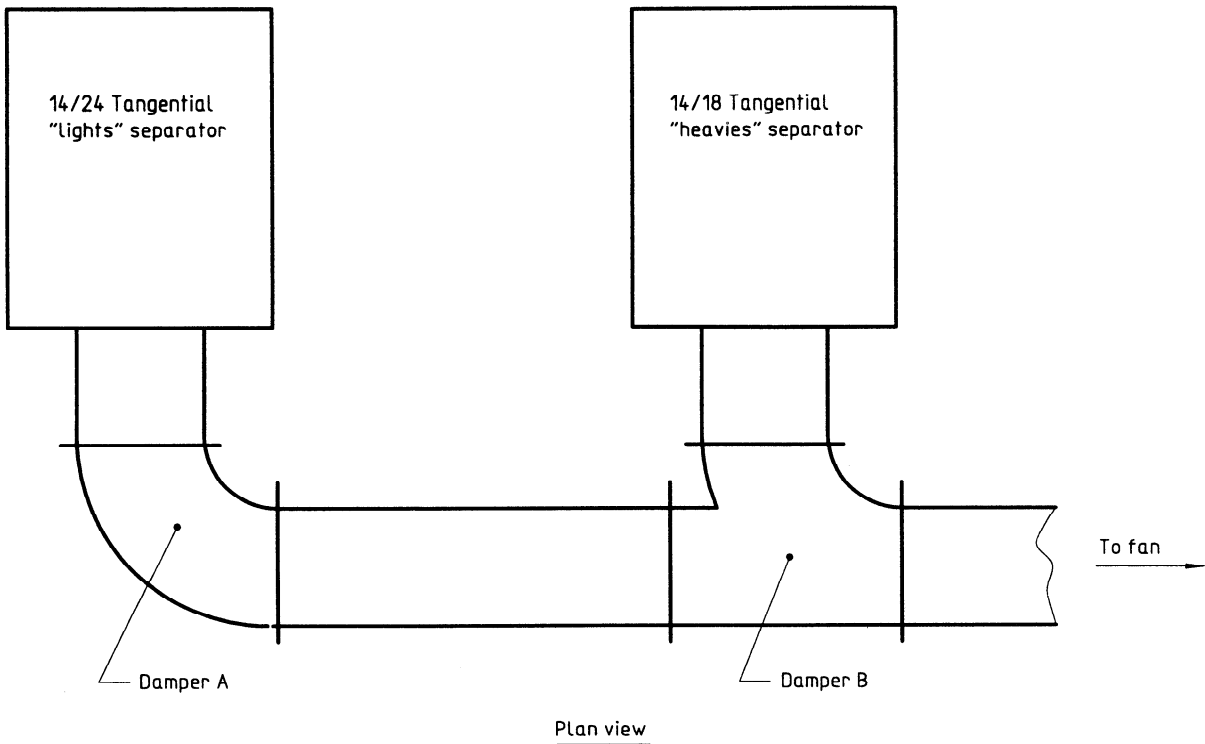
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a) Cross-sectional side view of duct showing position of plate

b) Full-scale cross section of plate.  
Use template with this contour

**Figure 4 — Outlet of thresher stem-deflector plate**



Plan view

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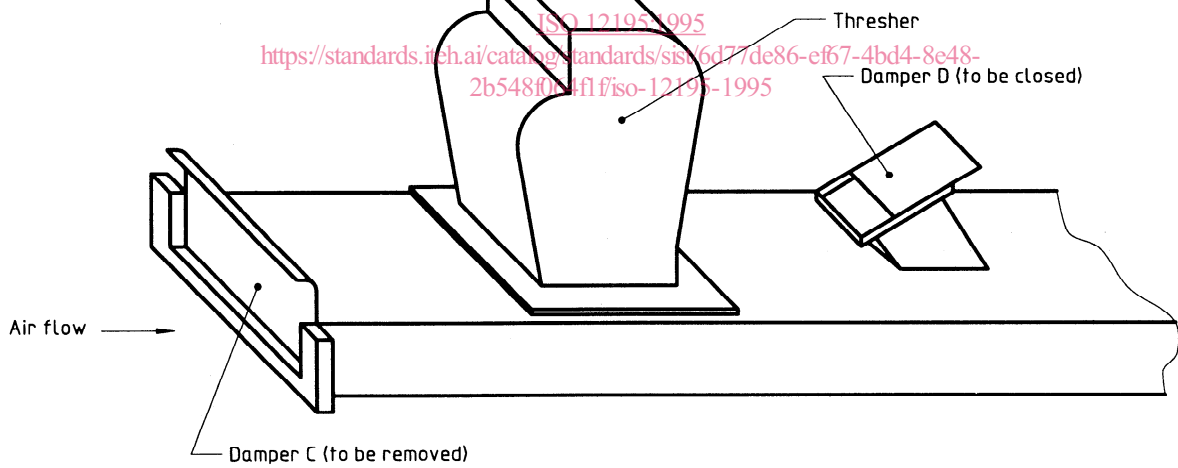
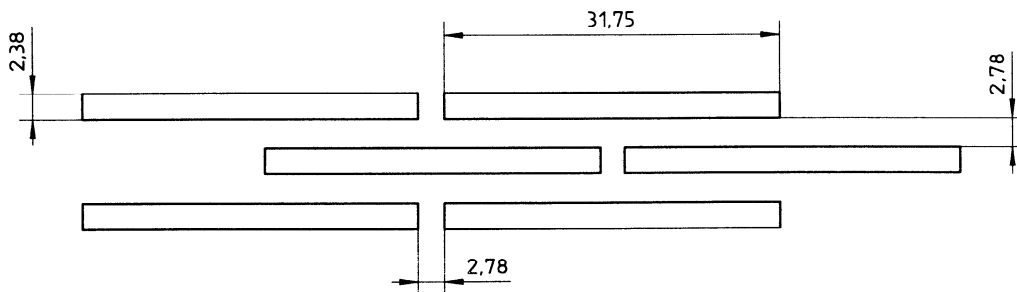


Figure 5 — Location of dampers

Dimensions in millimetres



NOTE — This 2,38 mm slotted-plate screen shall be fitted to a standard size sieve, 203,2 mm in diameter and 50,8 mm deep.

Figure 6 — A 2,38 mm slotted-plate screen for stacked-sieve-type stem shaker

## 4 Test method

A sample of tobacco strips is spread evenly across the feed conveyor (3.1.6) and is thus fed into the thresher (3.1.3) at a uniform rate. The threshed sample is pneumatically conveyed to a separating tower (3.1.9) where the lamina is removed from the threshed material using a defined and controlled air-flow rate, and discharged into a bin. The "heavies" from this separation are returned to the thresher for rethreshing. The operation continues for 4 min when the "heavies"-discharge door automatically opens and discharges the residual stems into a container for weighing.

Different types of tobacco strip, with differing bulk densities, will require different masses of sample to achieve the same volume feed into the thresher and different air-flow rates in the thresher and different air-flow rates in the separating tower to achieve the required separation of stem and lamina.

### 4.1 Sampling

Ensure the air-flow rate through the tower separator is set to standard in accordance with annex A. The nominal mass of sample to be used for the different tobacco types is given in table 1. If a sample is taken which is outside these limits, it should be discarded and a fresh sample taken. The sample can be freshly taken or can be the recombined residue from a lamina strip particle size test.<sup>2)</sup>

### 4.2 Procedure

**4.2.1** Weigh the sample and spread the sample evenly over the length and width of the feed conveyor. Ensure the "heavies"-discharge door and the separating tower doors are closed.

**4.2.2** Switch on the power and then switch on the following equipment in the order given:

- a) the fan,
- b) the 14/18 tangential "heavies"-separator airlock,
- c) the 14/24 tangential "lights"-separator airlock,
- d) the thresher,
- e) the vibratory conveyor,
- f) the winnower.

**4.2.3** Set the automatic timer to exactly 4 min. (This allows 160 s for the sample to feed into the thresher and 80 s for the thresher to clean the "heavies".) Wait for the manometer reading to settle and check that its reading is the same as that achieved during the setting-up procedure. If it differs from this figure, then check for possible causes such as those given in annex A and annex D and then repeat the setting-up procedure detailed in annex A.

Start the test by pressing the feed-conveyor start button. This automatically starts the timer. As the last of the sample feeds into the thresher, brush any residual strip particles from the feed conveyor into the thresher. After the test time of 4 min, the "heavies"-discharge door will open automatically and stems will be discharged from the machine and collected in a bin. Allow 60 s for the stems to discharge. Small deposits of fine stems remaining in the separating tower may be ignored.

**4.2.4** Return the light strips collected in the bin to the feed conveyor and spread them evenly over its length and width for a second pass. Close the "heavies"-discharge door and repeat the test procedure starting from 4.2.2. Collect any additional stem separated and add it to that from the first pass. Weigh the stem sample to the nearest  $\pm 1$  g.

Turn the power off.

**4.2.5** When samples are tested at frequent intervals, for quality control or for other purposes, it may be more convenient to keep the machine running between tests. In this case, only the vibratory and feed conveyors need be stopped and started between tests. Stopping the feed conveyor automatically resets the timer and re-energizes the discharge door solenoid. The discharge door shall be closed before each test.

### 4.3 Categorization of the stem content using the sieve-type shaker

All stem product, measured as "total stem content", from the stem tester is weighed and placed on the top screen (this will generally range between 50 g and 150 g).

Start the sieve-type shaker with the hammer engaged and simultaneously start a stop clock or electronic timer and run the shaker for exactly 5 min. Remove the sieve stack.

Remove any lamina bullets and record the mass of stem remaining on each screen and pan.

2) ISO 12194:1995, *Leaf tobacco — Determination of strip particle size.*