INTERNATIONAL STANDARD 3870

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Conveyor belts (fabric carcass), with length between pulley centres up to 300 m, for loose bulk materials — Adjustment of take-up device

Courroies transporteuses (à carcasse textile) de produits en vrac pour transporteurs jusqu'à 300 m de longueur d'entraxe — Course de réglage du dispositif de tension

First edition — 1976-11-01

UDC 621.867.212.3/.5 **Ref. No. ISO 3870-1976 (E)**

Descriptors : materials handling, bulk products, belt conveyors, conveyor belts, take-up devices, adjusting.

Price based on 3 pages

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3870 was drawn up by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, and was circulated to the Member Bodies in July 1975.

It has been approved by the Member Bodies of the following countries :

Australia	Germany	Spain
Austria	India	Turkey
Belgium	Italy	United Kingdom
Bulgaria	Mexico	U.S.A.
Canada	Netherlands	Yugoslavia
Finland	Poland	
France	Romania	

The Member Body of the following country expressed disapproval of the document on technical grounds :

Japan

Printed in Switzerland

Conveyor belts (fabric carcass), with length between pulley centres up to 300 m, for loose bulk materials — Adjustment of take-up device

0 INTRODUCTION

All belt conveyors must be equipped with a belt take-up device, whose functions are fourfold :

— ensuring adequate tension of the belt leaving the drive pulley so as to avoid any slipping of the belt;

— permanently ensuring adequate belt tension at the loading point and at any other point of the conveyor to keep the troughed belt in shape and limit belt sag between carrying idlers;

— compensating for operating belt length variations due to physical factors (instantaneous tensions, permanent elongation, outside temperature, temperature of conveyed materials, dampness, etc.);

— making available, if needed, an adequate extra length of belt to enable rejointing without having to add on extra pieces of belt.

0.1 Take-up devices

There are two main types of take-up device :

— fixed take-up devices that are adjusted periodically;

— automatic take-up devices (constant load type).

0.1.1 *Fixed take-up devices*

With systems of this type, the take-up pulley remains fixed between successive periodic adjustments.

a) The most frequently used type is the screw-operated take-up device, where the adjustment is manually effected by means of two screws acting upon the pulley bearings and which are tightened simultaneously or successively.

The operator has in general no practical means of measuring the tension; this generally leads to excessive tension of the belt (when the tension is insufficient, the belt slips and quickly deteriorates). This excessive tension is unavoidable and must be taken into account when determining the size of the belt, designing the mechanical components and calculating the adjustment.

For these various reasons, hand-operated devices are used only in the case of short conveyors (50 to 60 m) and under light duty cycle condition.

b) The belt tension can be adjusted by means of a mechanical, motorized device (for example, a winch) which does not, however, automatically compensate for belt length variations. A tension indicator (for example a dynamometer) can be included between winch and pulley.

This solution also demands careful checking of the tension and leads to excessive belt tension in order to avoid too frequent take-ups. It may, however, be used for long conveyors and under heavy duty cycle conditions, provided that these conveyors are equipped with belts the elongation coefficient of which is very low under the effect of the load and over a long period, i.e. wire belts with high tensile strength steel cords, which are used almost exclusively.

0.1.2 *Automatic take-up devices*

The take-up pulley is mounted on slides or on a trolley and travels freely while a constant tension is automatically maintained to ensure normal conveyor operation in all cases.

The most frequently used type is the gravity weight-operated take-up device.

Hydraulic, pneumatic or electrical take-up devices of various types are also used.

All types must include a system for adjusting belt tension.

For a given conveyor, the manufacturer will choose the type which is best adapted. This will be done in agreement with the user and the belt manufacturer.

0.2 Definition

adjustment : The total movement of the take-up pulley or pulleys. The percentages are based on the centre-to-centre distance between the end pulleys of the conveyor, excluding the adjustment if it is ensured by one of these pulleys.

0.3 Adjustment values

The adjustment must be determined for every individual case on consideration of the following factors :

— conveyor length;

— belt jointing system;

— belt carcass, determining elastic and permanent stretch, the values of which are given by the manufacturer;

— ratio of the operating tension to the maximum allowed tension;

— starting-up system and magnitude of the resulting dynamic force (instantaneous or successive) on the belt;

— position of the take-up device;

— possibility, when the take-up device has reached the end of its adjustment length, of its being brought back to its former position by cutting and rejointing the belt;

— weather conditions in which the installation is operated (wide temperature variations between day and night, for example);

— influence on some types of belts of the physical characteristics of the conveyed materials (heat or excessive moisture content, for example), especially if covers are not carefully checked and maintained periodically.

1 SCOPE AND FIELD OF APPLICATION

This International Standard recommends the adjustment values which are valid for the most commonly used belts and for conveyors with a maximum length not greater than 300 m, fitted solely with fabric carcass belts. Owing to the wide variety of belt types, and to the number of determining factors in choosing the adjustment, it is not possible to propose general numerical values applicable to all cases. For belts with a fabric carcass whose length exceeds 300 m and belts with a metal carcass of any length, the manufacturer should justify the chosen adjustment.

2 NORMAL ADJUSTMENT VALUES

These adjustments, shown in the table, are determined on the understanding that during the jointing operation an initial tension, limiting the sag between carrying idlers and between return rollers to 2 %, will be applied to the free ends of the belt.

3 NOTES RELATING TO THE USE OF THE TABLE

3.1 Influence of the jointing methods

3.1.1 *"Endless" belts*

In the case of belts (generally short) ordered "endless" for conveyors, and which are delivered measured tensionless with a tolerance of ± 0,5 %, it is recommended that the adjustments given in the table be increased by an amount equal to 1 % of the between-centres conveyor distance, in order to avoid too frequent belt changes.

3.1.2 *Belts with mechanical joints*

If jointing can be carried out on the conveyor itself, with an initial tension in conformity with the definition given in footnote 1) to the table, adjustment values may be reduced to the minimum compatible with the operating and rejointing conditions of the belt which are specified by the manufacturer.

This possibility is, of course, excluded if, subsequently, spliced joints should be used.

TABLE — **Adjustment values for take-up devices**

Type of take-up device \ Conveyor length	0 to 12 m	12 to 30 m	30 to 60 m	60 to 150 m	150 to 300 m
Fixed hand-operated take-up device, *without* tension indicator Minimum adjustment	0,35 m 0,3 m	3 %	3 %		
Fixed hand-operated or motorized take-up device, *with* tension indicator		2,5 %	2,5 %	2,5 to 2 %	2 %
Automatic take-up device Minimum adjustment		3,5 % 0,6 m	3,5 to 3 %	3 to 2,5 %	2,5 %
Automatic take-up device[1)] Minimum adjustment		3 % 0,6 m	3 to 2,5 %	2,5 to 2 %	2 %

1) Reduced adjustments are applicable when it is possible to apply to the free ends of the conveyor belt, during the jointing operation, an additional tension (pre-tension) which balances the force exerted by the device as allowed for in normal service.

This force is calculated to ensure driving of the conveyor belt at all times : empty and loaded, at constant speed, when starting, when braking to a stop.

3.1.3 *Belts initially with a temporary joint (mechanical or spliced) and subsequently with a permanent spliced joint after a certain period of use*

If the belt manufacturer agrees, the normal adjustment values may be reduced by 0,5 to 1 %, the minimum values remaining unchanged.

3.2 Influence of special operating conditions

3.2.1 The adjustment may be reduced by approximately 0,5 % :

a) when the belt is usually operating at less than 60 % of the recommended maximum belt tension, or

b) the conveyor installation and operating conditions are especially favourable, in particular :

— if the belt is protected from bad weather conditions, not exposed to damp;

— if the materials transported are at temperatures not exceeding 60 °C;

— if the starting-up tension is less than 1,5 times the normal operating tension.

If conditions a) and b) are met simultaneously, a reduction exceeding 0,5 % may be considered by the conveyor manufacturer, with the agreement of the belt manufacturer.

3.2.2 The adjustment should be increased by approximately 0,5 % when operating conditions are bad, in particular :

— if the belt is exposed to bad weather conditions;

— if the materials transported are very damp (either naturally or due to sprinkling);

— if the temperature of the materials exceeds 60 °C;

— if the starting up tension is more than 1,5 times the normal operating tension.

If conditions 3.2.1 a) and 3.2.2 are met simultaneously, the normal values of adjustment should be applied.

3.3 Influence of the type of belt

Certain belts used for specific applications require adjustment values greater than those given in the table.

The manufacturers of these belts must draw the attention of the users and conveyor manufacturers to this point.

3.4 Influence of the installation conditions

It may happen that, because of local circumstances, the conveyor manufacturer is unable to adhere to the recommended adjustment values.

He may in such cases, and with the agreement of the belt manufacturer and the user, adopt shorter adjustments, provided however, that these allow normal operation of the conveyor, subject only to more frequent cutting and rejointing operations.

This page intentionally left blank

This page intentionally left blank

This page intentionally left blank