



CONVEYOR EQUIPMENT
MANUFACTURERS ASSOCIATION

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CEMA Standard No. 576

**Classification of Applications
for Bulk Material Conveyor Belt
Cleaning**

Conveyor Equipment Manufacturers Association, Inc.

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FOREWORD

Conveyor belt cleaners are used to remove fugitive material, otherwise known as carryback, from the return side of the conveyor belt after the bulk material has been discharged. Ideally, this will be accomplished from within the chute works so that the removed carryback will pass onto the next system element. However, other locations may also be suitable. It is understood that the methods and designs for cleaning belts are numerous.

This guide has been established to provide a uniform method for determining the application class of any individual belt conveyor. This application class will assist in the selection of an appropriate conveyor belt cleaner or conveyor belt cleaner system for the application. By ranking the application, guidance concerning the needed ruggedness and durability of the applicable conveyor belt cleaner will be available. Manufacturers voluntarily specify into which class their particular designs fall.

Belt cleaner designs vary significantly, and it is each manufacturer's responsibility to provide equipment that is suitable for the application as rated and the intended use.

The degree of cleanliness resulting from a properly specified installed and maintained belt cleaner or multiple belt cleaner system is not covered by this guide. It is the end user's responsibility to define the desired level of cleaning that is required for their application. It is the responsibility of the belt cleaner supplier to provide a system and maintenance requirements that can meet the end user's expectation of cleaning results.

This guide assumes the application class ranking will consider the conveyor belt to be in “new” or “as new” condition.

This guide makes no statement regarding the cleaning performance or life of any conveyor belt cleaner. Contact a CEMA member for information.

SUMMARY OF CHANGES

On 2014, it was added ANSI/CEMA Standard No. 550 Material Classification Code Chart as an Appendix for reference. Added Material Description from CEMA 550 for the two materials used as examples.

Additionally, a material was changed – Coal, Mined. As opposed to Coal, Bituminous, Mined, 50 Mesh & Under to better match the Metric Example.

On 2021, after a review of ANSI/CEMA std. 550, this guide was reviewed for consistency.

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INTRODUCTION

The proper selection of a belt cleaner must consider the environment in which the belt cleaner must operate. Several factors will play significant roles in deciding the appropriate selection.

This guide provides a method to condense a complex operating environment into a single classification number to be used when selecting belt cleaners.

RANKING AND CLASS SYSTEM

The application class is determined using the following factors.

1. Belt width
2. Belt speed
3. Quantity and type of belt splices
4. Abrasiveness of the material
5. Stickiness/moisture content of the material

For the purposes of this classification, conveyor belts must be new or in “as new” condition.

METHOD

The environment in which the conveyor belt cleaner must operate is divided into two main categories, the conveyor belt itself and the material carried. There are three factors describing the conveyor belt (belt width, belt speed, quantity and type of belt slices) and two factors describing the material (abrasiveness of the material, stickiness/moisture content of the material) for a sum of five. Each of the five factors is rated individually. The final application score is the sum of all five factors.

The final score is divided into five application class levels and should be specified when conveyor belt cleaners are being selected. The selected conveyor belt cleaner should have a rating that meets or exceeds the calculated application class score. (Note: ANSI/CEMA Standard No. 550 is a valuable tool for assigning values to the material categories. A copy of its Material Classification Chart is included here as an appendix.) An explanation of the factors appears below.

CONVEYOR BELT CHARACTERISTICS

Belt Width Chart

Score	Description
0	<24 in (<610 mm) width
1	24 in – 42 in (610 mm – 1067 mm) width
2	>42 in – 60 in (1067 mm – 1524 mm) width
4	>60 in – 96 in (1524 mm – 2438 mm) width
8	>96 in (>2438 mm) width

Belt Speed Chart

Score	Description
1	<300 fpm (<1.5 m/s)
2	300 – 600 fpm (1.5 – 3 m/s)
4	601 – 1000 fpm (3.1 – 5 m/s)
8	>1000 fpm (>5 m/s)

Splice Type Chart (Consider that the splice condition may change with time. Use a higher score when in doubt.)

Score	Description
0	Vulcanized (for the entire life of the belt)
2	Mechanical splices with belt speed below 500 fpm (2.5 m/s)
4	Mechanical splices with belt speed 500 fpm (2.5 m/s) or greater

MATERIAL CHARACTERISTICS

Abrasiveness (Choose the worst case expected conditions in situations where the conditions will vary)

Score	Description
1	Mildly Abrasive (ANSI/CEMA Standard 550 code designation 5, Abrasive index 1-17)
2	Moderately Abrasive (ANSI/CEMA Standard 550 code designation 6, Abrasive index 18-67)
3	Extremely Abrasive (ANSI/CEMA Standard 550 code designation 7, Abrasive index 68-416)

Stickiness/Moisture Content Chart (Choose the worst case expected conditions in situations where the conditions will vary)

Score	Description
1	Mild/Dry (<2% moisture by weight)
2	Medium/Moist (2-8% moisture by weight)
4	Heavy/Wet (>8% moisture by weight)
8	Severe/Wet/Sticky slurry with fines

The sum of the individual scores is broken down into the following ratings.

APPLICATION SEVERITY RANKING CHART

Score	Description
≤ 6	Class 1
7-10	Class 2
11-15	Class 3
16-23	Class 4
≥24	Class 5

EXAMPLES – Imperial Units

From Table of Materials (ANSI/CEMA Std. No. 550)

- Material: Limestone
- Loose Bulk Density: 55-95 lbf/ft³
- CEMA Material Code: 75A4046MY

A conveyor designer needs to choose belt cleaners for a conveyor carrying limestone from the quarry pit. The conveyor width is 36 in and the belt speed is 420 fpm. The belt will be installed with a vulcanized splice but will be spliced mechanically during its life.

Referring to the Belt Width chart, a score of “1” for the 36” width is assigned.

From the Belt Speed chart, a score of “2” is assigned.

From the Splice Type chart, a score of “2” is assigned since this belt will typically have mechanical splices in it even though it is vulcanized at commissioning.

Referring to ANSI/CEMA Standard No. 550, the CEMA material code is 75A4046MY which contains designation code 6 as the abrasiveness rating for limestone. From this, a score of 2 is assigned.

From the Stickiness/Moisture Content Chart, a score of “4” is assigned. Even though the majority of the time this material will run fairly dry, groundwater or heavy rain can make the pit very wet. A conservative ranking would assume wet conditions.

The total score would be $1+2+2+2+4=11$. From the Application Severity Ranking Chart, the designer would select conveyor belt cleaners rated for at least Class 3 applications.

EXAMPLES – Metric Units

From Table of Materials (ANSI/CEMA Std. No. 550)

- Material: Coal, Bituminous, Mined
- Loose Bulk Density: 641-961 kgf/m³
- CEMA Material Code: 50D335LNXY

A designer needs to choose belt cleaners for a new conveyor in a terminal expansion. The material conveyed will be Coal, Bituminous, Mined on an 1800 mm wide belt at 4.1 m/s. The site specified a vulcanized splice for all belts.

Referring to the Belt Width chart a score of “4” for the 1800 mm width is assigned.

From the Belt Speed chart, a score of “4” is assigned.

From the Splice Type chart, a score of “0” is assigned since this belt will be vulcanized throughout its life.

Referring to ANSI/CEMA Standard No. 550, the CEMA material code is 50D335LNXY which contains 5 as the abrasiveness rating for bituminous coal. From this, a score of 1 is assigned.

From the Stickiness/Moisture Content Chart, a score of “2” is assigned. Rain and anti-dust measures could result in extra moisture in the coal. A conservative ranking would assume moist conditions.

The total score would be $4+4+0+1+2=11$. From the Application Severity Ranking Chart, the designer would select conveyor belt cleaners that rated for at least Class 3 applications.

APPENDIX I

MATERIAL CLASSIFICATION CODE CHART (ANSI/CEMA Std. No. 550)

Major Class	Material Characteristics Included		Definition and Test Reference	Code Designation
Density	Bulk Density, Loose		A-8	Actual lbs/ft ³
Size	Very Fine	No. 200 Sieve (0.0029") and under	A-17	A ₂₀₀
		No. 100 Sieve (0.0059") and under		A ₁₀₀
		No. 40 Sieve (0.016") and under		A ₄₀
	Fine	No. 6 Sieve (0.132") and under		B ₆
	Granular	1/2" and under		C _{1/2}
		3" and under		D ₃
		7" and under		D ₇
	Lumpy	16" and under		D ₁₆
		Over 16" to be specified		
		X = Actual Maximum Size		D _x
Irregular	Stringy, Fibrous, Cylindrical, Slabs, etc.	E		
Flowability	Very free flowing -- Flow Function > 10		A-12	1
	Free flowing -- Flow Function > 4 but < 10			2
	Average flowability -- Flow Function >2 but < 4			3
	Sluggish -- Flow Function < 2			4
Abrasiveness	Mildly Abrasive	-- Index 1 - 17	A-1	5
	Moderately Abrasive	-- Index 18 - 67		6
	Extremely Abrasive	-- Index 68 - 416		7
Miscellaneous Properties or Hazards	Builds up and hardens		B-3	F
	Generates Static Electricity		B-5	G
	Decomposition - Deteriorates in storage		B-7	H
	Flammability		B-11	J
	Becomes plastic or tends to soften		B-2	K
	Very dusty		B-8	L
	Aeration - Fluidity		B-1	M
	Explosiveness		B-10	N
	Stickiness - Adhesion		B-18	O
	Contaminated		B-19	P
	Degradable - Size breakdown		B-6	Q
	Gives off harmful or toxic gas or fumes		B-12	R
	Highly corrosive		B-4	S
	Mildly corrosive		B-4	T
	Hygroscopic		B-13	U
	Interlocks, mats or agglomerates		B-14	V
	Oils present		B-15	W
	Packs under pressure		B-16	X
	Very light and fluffy - May be windswept		B-20	Y
Elevated temperature		A-11	Z	
Angle of Repose	Loose		A-5	
Angle of Maximum Inclination (of a Belt)	Conveyor		A-4	