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Guidance on Industry Standard for Belt Conveyors, Belt Feeders, Belt Trippers

GIS 38-101

BP GROUP
ENGINEERING TECHNICAL PRACTICES

Foreword

This is the first issue of Engineering Technical Practice (ETP) BP GIS 38-101. This Guidance on Industry Standard (GIS) is based on parts of heritage documents from the merged BP companies as follows:

ARCO

ES 76

Belt Conveyors, Belt Feeders, Belt Trippers

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1. Scope

This GIS provides guidance on industry standard for design and fabrication, inspection and testing, documentation, and installation of belt conveyors, belt feeders, belt trippers, and associated equipment.

2. Normative references

The following normative documents contain requirements that, through reference in this text, constitute requirements of this technical practice. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this technical practice are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies.

American Institute of Steel Construction (AISC)

AISC 101 Designing with Structural Steel - A Guide for Architects.

American National Standards Institute (ANSI)

ANSI B3.15 Life of Ball Bearings.
ANSI B3.16 Life of Roller Bearings.
ANSI B105.1 Welded Steel Conveyor Pulleys with Compression Type Hubs.

American National Standards Institute (ANSI) / American Gear Manufacturers Association (AGMA)

ANSI / AGMA 6010-F97 Standard for Spur, Helical, Herringbone, and Bevel Enclosed Drives.

American National Standards Institute (ANSI) / National Fluid Power Association (NFPA)

ANSI / (NFPA) T3.16.2 Hydraulic Fluid Power - Design for Nonintegral Industrial Reservoirs.

American Society for Testing and Materials (ASTM)

ASTM A36 Standard Specification for Carbon Structural Steel.
ASTM A235 Specification for Carbon Steel Forgings for General Industrial Use.

American Welding Society (AWS)

AWS A5.1 Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.
AWS A5.17 Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.
AWS A5.18 Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding.
AWS D1.1 Structural Welding Code Steel.

BP Engineering Technical Practices (ETPs)

GP 12-45 Guidance on Practice for Electrical for Packaged Systems
GP 60-50 Guidance on Practice for General Issues-Equipment Packages



Conveyor Equipment Manufacturers Association (CEMA)

CEMA, Belt Book Belt Conveyors for Bulk Materials (Sixth Edition).

International Code Council (ICC)

IBC International Building Code-Includes Erratas Updated 11/03/03; 4/2004; 5/2004; 8/12/04; 12/2004; 01/2005.

3. General

- a. Equipment shall be suitable for outdoor or indoor installation as specified.
- b. Materials and components shall be shipped in maximum sizes consistent with delivery restriction.
- c. Shop assembly shall be to maximum extent to minimize field erection or installation.
- d. Unless specifically stated otherwise in the procurement documentation, the electrical components shall conform to the requirements in GP 12-45.
- e. Quotation shall comply with this standard. Alternate quotations may be submitted, provided the following two conditions are met:
 1. Significant process, price, or delivery advantage is indicated, or a superior product is offered at a justifiably higher price, or a product of equal quality is offered at a lower price.
 2. Alternate quotation states deviations from this GIS, and complete engineering details of alternate material and/or design are submitted for BP review.
- f. Deviations between this GIS and other contract or procurement documents, unless specifically indicated as an exception, shall be submitted to BP for written ruling.
- g. Company and supplier shall determine the applicable requirements in GP 60-50 to be followed and include those as part of the procurement documentation.

4. Conveyors**4.1. General**

- a. Conveyors and components shall be manufacturer's normal design for specified service.
- b. Standard replacement parts shall be available in 60 days or less.
- c. Unless specified otherwise, design shall be based on standards adopted by CEMA.
- d. BP design parameters indicated on data sheets shall be verified.
- e. Selected conveying equipment shall be suitable for service and capacities specified.
- f. Drives and conveyor components shall be sized to start conveyor under full belt load condition.
- g. Conveyors with vertical concave curves shall be designed to prevent belt lift off under empty, loaded, or partially loaded condition.
- h. Head pulleys shall be raised above contact line between conveyor belt and centre idler roll to one half of full trough depth.



4.2. Idlers

4.2.1. General

- a. Unless specified otherwise, idlers shall be:
 - 1. “Prelubricated,” factory sealed for life, ball or roller bearing type belt conveyor idlers CEMA series rated.
 - 2. Identified by manufacturer brand name and model number.
- b. Roller ends shall be smooth and free of sharp edges and burrs.
- c. Idler rolls shall be fitted with end shields to protect bearings and seals.
- d. Seals shall be suitable for taconite type service.
- e. Idler bearing ratings shall comply with ANSI B3.15 and B3.16.
- f. Lubricated idlers, if specified, shall be equipped for one side through lubrication using standard 16 mm (5/8 in) diameter “button head” type lubrication fittings.
- g. Minimum L-10 life rating shall be 60,000 hours at conveyor rated capacity and speed.
- h. Idlers mounted under skirtboards shall be designed so that they can be removed or replaced without interference or dismantling of skirts, chutes, or frame.

4.2.2. Troughing idlers

- a. Troughing idlers shall be three roll type, with end and centre rolls interchangeable.
- b. Troughing angle shall be as specified on conveyor data sheets.

4.2.3. Training idlers

- a. Training idlers shall either be:
 - 1. Positive action type, with ball bearing actuated rollers mounted on both ends of idler bracket that shall be free to swivel about vertical pivot on base.
 - 2. Actuating disc type, which can be used if belt lift might occur as on conveyors with concave curves.
- b. Conveyors with fabric belt, conveyors with flat return idlers, and conveyors that are 24 m (80 ft) or longer shall have training idlers.
- c. Training idlers shall be placed within 15 m (50 ft) of both head and tail pulley and at no more than 45 m (150 ft) centres, with minimum of two per conveyor.
- d. Training idlers shall not be located under skirt boards.

4.2.4. Return idlers

- a. Return idlers shall have same bearings as troughing idlers.
- b. Unless specified otherwise, return idlers shall have standard drop bracket.
- c. Return idlers shall be solid roll or self centring spiral roll as specified on conveyor data sheets.
- d. Spiral return rollers shall be used if conveying material, e.g., wet green coke, can agglomerate to solid return rollers and lead to misalignment.
- e. Load rating shall be such that removal or destruction of any single return idler does not cause failure of adjacent idlers.
- f. Closer idlers shall not be used in lieu of snub pulley.



4.2.5. Impact idlers

- a. Impact idlers shall be rubber cushion type, with troughing angle.
- b. Idler assemblies shall be mounted such that they can be removed without interference with skirts, chutes, or frame.
- c. Impact idlers shall not be required for handling green coke and calcined coke unless vertical drop is more than 240 cm (8 ft). Instead, regular troughing idlers (in accordance with b.) at 30 cm (12 in) spacing shall be provided.

4.2.6. Transition idlers

- a. Rigid frame transition idlers shall be adjustable troughing angle type, adjustable in approximately 2,5 degree angle increments.
- b. Rigid frame transition idlers shall be provided in locations where conveyor belt changes from flat to trough and vice versa, i.e., at head and tail ends of troughed conveyors.

4.2.7. Picking idler

- a. Picking idlers shall be used on belt feeders outside of hopper opening.
- b. Picking idlers shall have troughing angle as shown on feeder data sheet.

4.2.8. Belt scale idlers

- a. Belt scale idlers shall have inline troughing rolls and shall comply with belt scale manufacturer specifications.
- b. Idlers shall be colour coded for easy identification.

4.2.9. Idler spacing

- a. Idler spacing shall be such that idler load rating is not exceeded.
- b. Maximum belt sag on carrying run shall not exceed 2% of idler spacing if running with full belt load condition.

4.3. Pulleys**4.3.1. Loads**

Pulley loads shall be determined from larger of either tension developed using connected motor kW (hp) or 75% of tension developed during acceleration.

4.3.2. Lagging

- a. Pulley lagging shall be vulcanized to pulley. Drive, snub, and bend pulleys shall be lagged as a minimum.
- b. Crowning of pulleys by varying thickness of lagging shall not be acceptable.
- c. Lagging for driven and nondriven pulleys shall be 19 mm (3/4 in) thick diamond grooved. Grooves shall be 9 mm (3/8) in deep by 9 mm (3/8 in) wide on 63 mm (2 1/2 in) centres.

4.3.3. Assemblies and shipping

- a. Pulley assemblies, including pillow blocks and coupling halves, shall be completely shop assembled and mounted on support frame.
- b. Critical dimensions shall be verified.
- c. Motions shall be checked and tested in shop prior to shipment.
- d. Pulley assemblies shall be shipped as complete unit.

