



NATIONAL PETROCHEMICAL COMPANY
STANDARDS

MATERIAL STANDARD
FOR
BAG PACKING & HANDLING SYSTEM

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PART I BELT CONVEYOR

1 SCOPE

- 1.1 This part covers the minimum basic requirements for design, materials, engineering, manufacture, inspection, testing of various types of belt conveyor for Bulk Handling.
- 1.2 Unless otherwise indicated, all conveyors, drives, supports, electricals including control panel and other material necessary to complete the conveying system which will be shown on purchaser's data sheets and/or drawings shall be furnished by vendor.
- 1.3 Vendor shall furnish all appliances, special tools, and accessories that are necessary or incidental to the proper installation and operation of the equipment even though these items will not included on the drawings, specifications, or data sheets.
- 1.4 A summary of utility requirements including electric power, plant and instrument air, cooling water, steam, etc., shall be submitted with the vendor's quotation.
- 1.5 Vendor shall submit recommendations for following 3 categories of spare parts:
- a) Erection and pre-commissioning.
 - b) Commissioning and initial operation.
 - c) 2 years normal operation.

2 CONVEYOR DESIGN

2.1 GENERAL

- 2.1.1 Conveying system shall be designed for 24 hr continuous operation at the rated output in the specified environment.
- 2.1.2 Vendor shall prepare general arrangement drawings of conveying system showing location of gravity take-ups, bents, support locations, location of transfer towers, etc.

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- 2.1.3 It shall be the responsibility of vendor to guarantee performance of the belt conveyor system. The data sheets and drawings will indicate minimum requirements, and these shall in no way relieve the vendor of his responsibility for providing a system capable of meeting the required performance. Before submitting his proposal, vendor is to include the proper selection of the following:
- Belt width, speeds and type of construction.
 - Motor power and drive component sizes.
 - Pulley and shaft diameters.
 - Bearing sizes.
 - Idler types, spacing and construction.
 - Take-up distances, for belt.
 - Vertical curve radii.
 - Transfer and loading point geometry and chute details to insure centre loading of belts.
 - Auxiliary mechanical and electrical items.
 - Structural features such as access, bracing for horizontal pulls, etc.
 - Architectural details such as roofing, siding, doors, windows, ventilation, etc.
- 2.1.4 Where required, vendor shall furnish brakes and/or fly wheels to balance the conveyor system to prevent flooding of chutes.
- 2.1.5 Consideration shall be given by vendor to standardization and grouping of sizes of bearings, shafts, motor KW, speed reducers, etc., to minimize spare part requirements.
- 2.1.6 Vendor shall select and specify the materials of construction suitable for the service conditions. The materials specified shall comply with ASTM Standards or equivalent standards of the country of origin. However, vendor shall mark equivalent ASTM Standard, which shall be subject to purchaser/owner's approval. Material subject to welding shall be of weldable quality. All material shall be new.



2.2 BELTING

2.2.1 Belts shall conform to data which will be specified in conveyor data sheets.

2.2.2 The belting shall be selected considering the following.-

- Impact resistance at chute.
- Spliceability.
- Elongation of belt during operation.
- Troughability against carriers.
- Resistance to conveying materiel, sunlight.
- Wear, cutting and fatigue resistance.
- Carcass strength for resisting tension.
- Adhesion between each ply.
- Resistance against flexture by pulley and variation of working tension.

2.2.3 Vendor shall select type of *drive* suitable for each conveying system to withstand the imposed loading and tension required.

2.2.4 Vendor shall offer most suitable belt material for prescribed service.

2.2.5 The number of ply shall not be less than three in any case.

2.2.6 The number of ply shall be determined based on selection of fiber material and permissible tension taking into account safety factor.

2.2.7 Belts splicing shall be vulcanization type to ensure *higher* strength, smoothness and impact resistance. Splicing/repairing method shall be fully described by vendor.

2.2.8 Unless otherwise specified, belt splices shall be field vulcanized and the belts shall include sufficient length for the splice. A vulcanizer of suitable size shall be supplied as special tool.

2.2.9 Number of vulcanized joints shall be kept to minimum.

2.2.10 Convey curves of the carrying portion of the belt conveyor shall be of idlers only (No bend pulleys).

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2.3 IDLERS

- 2.3.1 All idlers shall be designed for useful bearing life (BU) of 30,000 hr minimum at 500 rpm and 1.15 impact factor. Any idlers which failed to meet the useful life requirement of 30,000 hr at 500 rpm and 1.15 impact factor shall be replaced (material and labour included) by vendor at no cost to purchaser.
- 2.3.2 All conveyor idler rollers shall be of welded Steel construction unless otherwise specified. Idlers shall be permanently lubricated and sealed for life. Ball-type antifriction bearings with labyrinth seal and dust shield shall be used on all idlers.
- 2.3.3 Except for reversible conveyors, all troughing idlers shall be tilted two degrees from vertical in the direction of belt travel. Bevel washers shall be provided if tilt is not built into idler unit.
- 2.3.4 Centre idler shall be designed to carry two-third of the total weight.
- 2.3.5 Standard troughing idlers and impact idlers shall be of three equal length rolls, 45 degree troughing type, unless otherwise specified. Impact idlers shall have rubber cushion rolls.
- 2.3.6 Maximum idler spacing is to be as what will be shown on purchaser's data sheets. Impact idler spacing at the loading points shall be no more than half the belt width.
- 2.3.7 Two transition idlers shall be provided at both head and tail end of the conveyor. Transition idlers shall contain one each 20 and 30 degree trough idlers.
- 2.3.8 Return idlers shall be rubber disc type.
- 2.3.9 All idlers shall be equipped for single side lubrication.
- 2.3.10 Grease fittings for idler lubrication shall be located outside the belt cover, in such a way that it does not interfere with the operation of belt covers.

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2.4 PULLEYS

- 2.4.1 Pulleys shall be no smaller than minimum sizes which will be indicated on the data sheets. They shall be of welded construction with solid recessed ends and may be provided with solid or compression hubs. Drive pulleys shall be crown-faced and have rubber lagging with herring-bone grooves. All pulleys shall be rubber lagged.
- 2.4.2 Pulley bearings shall be of the anti-friction roller type and selected for use by a life (BU) of 30,000 hr minimum. All pulley shaft bearing shall be of the self-aligning type. One bearing shall be fixed and the other shall be the floating type. Each pair of bearings supporting a shaft shall be selected to carry the proper loading at operating speed and shall have adjustable bases with screws and shims for bearing alignment.
- 2.4.3 All shafts shall be of cold rolled Steel shafting, ASTM A 108 Grade **1040**. Shafts are to be designed for the maximum torsion and bending loads and shall not be stressed to more than 421.8 kg/cm^2 in shear for combined torsion and bending only. All shafts shall be provided with accurately machined key seats for all torque transmitting connections. All shafts shall be straight within limits of "straightness tolerance" Table 30 of ASTM A29. Shaft ends shall not protrude from bearings unless extension is required for mounting of components.
- 2.4.4 All drums shall be properly balanced or machined to ensure a satisfactory concentricity. Drums covers shall not need replacement for at least two years.
- 2.4.5 Width of pulleys shall be at least 100 mm more than the width of belts.
- 2.4.6 Pulleys in contact with dirty side of the belt shall be provided with adjustable scraper system.
- 2.4.7 Pulleys shall be checked for balance to promote even running. The angle of wrap of the belt on head pulley shall be 210 degrees., where possible.
- 2.4.8 The diameter of the pulleys shall be selected considering belt tensions and belt manufacturer's recommendations.
- 2.4.9 Holdbacks shall be provided on inclined conveyors. Holdbacks shall be fully enclosed, heavy-duty roller type and shall be mounted on the pulley shafts.
- 2.4.10 All decline conveyors shall have motor mounted brakes.

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2.5 TAKE - UPS

- 2.5.1 Take-ups shall be furnished as what will be indicated on the drawings or data sheets. Take-up travel is to be verified by vendor.
- 2.5.2 Conveyors with short centers, screw take-ups shall be acceptable; generally take-ups shall be gravity type.
- 2.5.3 Screw take-ups shall be adequately housed to give maximum protection against dust and falling materials.
- 2.5.4 Gravity type take-ups, in addition to pulley frames and guides, shall include sheaves, sheave brackets, counterweight guides, wire rope fittings to be mounted on structure. Steel box with slope covers to prevent material accumulation for counterweight shall be furnished for field addition of weight. Lifting lugs shall be provided to hold take-up frame in up position during erection. Where take-ups are located above the floors, take-up weights shall be suspended by wire rope so that the working distance of the weights is closed to grade level.
- 2.5.5 Gravity take-up box for weight shall be designed for scrap metal punch fill.
- 2.5.6 Take-up weights shall be preweighed and packed individually for each conveyor. In addition, vendor shall provide 10% extra weight.
- 2.5.7 Deflectors shall be necessary for the counterweights to avoid any deposition of materials.
- 2.5.8 For belt slackening during maintenance, hand winches with cables shall be installed for raising the counter-weight.
- 2.5.9 Take-up travel shall comply with rubber belt manufacturer's recommendations and shall take into account elasticity variations caused due to different loading conditions, aging of the rubber belts and stresses caused due to starting and breaking, etc.
- 2.5.10 The tension gear shall be capable of limiting the belt sag between the idlers to 2% of the span.

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