







National Accreditation Board for Testing and Calibration Laboratories (A Constituent Board of Quality Council of India)



CERTIFICATE OF ACCREDITATION

LABORATORY DIVISION, NRC INDUSTRIES LTD.

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2005

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

9th Mile Stone, Kashmir Road, Verka, Amritsar, Punjab

in the field of

TESTING

Certificate Number Issue Date

TC-6102 10/08/2017

Valid Until 09/08/2019

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL. (To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Signed for and on behalf of NABL

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N. Venkateswaran Program Director

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efelia

Anil Relia Chief Executive Officer



NRC Industries Limited

NRC Industries Limited has state-of-the-art manufacturing facility, exemplary quality assurance and sophisticated research and development (R&D). The company has proven its pioneering position in designing and manufacturing world class conveyor belts in conformity with international specifications.

NRC Industries Limited, has the certifications of ISO 9001:2015 for quality management systems, ISO 14001-2015 for environment management systems and certificate of accreditation by NABL (ISO 17025-2005) for finished product testing laboratory.

NRC synthetic fabric re-inforced (SFR) conveyor belts carry the distinction of quality and service, associated with constant upgradation through cutting edge R&D.



Some of our Key personnel have more than 50 years of experience in the research and development, manufacturing and marketing of conveyor belts for bulk material handling with a specialization in underground mining operations. NRC has proven track record of Innovation in product design and application engineering with a deep commitment to customer service and safety.

NRC has the ability to significantly enhance the efficiency and productivity of bulk material handling operations while keeping safety as our number one priority. Given the severe conditions under which conveyor systems operate, it is important to select the right belt for each application. Conveyor Belts that are built to withstand the rigorous requirements for a variety of applications from General Purpose, High Heat, Fire Resistance, Moderate Oil Resistance, Abrasion Resistance, Hot Asphalt and Static Conductivity to meet International Guidelines and produce overall trouble free long service life. With our stringent quality control mechanisms and one of the best conveyor belting test facilities worldwide, we produce conveyor belt to meet your rigorous standards to provide the best quality.

Company

- Extensive In house Weaving capability & multiple RFL dipping lines.
- Multiple State-of-the -art finishing lines. Vertically integrated plant.
- Extensive In-house testing facility of both raw materials & finished belt.
- 2400mm Steel Cord belt production line.
- 2100mm calendar line along with multiple other calendar lines.
- Hydraulic press lines.
- 2 Rotocure Production lines.
- 11D Ban bury Mixing plant.

NRC's extensive experience with innovative textile design and nanufacturing insures belting products with exceptional performance and a fast response to specific customer requirements.

- Quick response to requests for custom design and engineering enhancements to suit customer requirements.
- Proven expertise in textile design and weaving technology.
- Proven expertise in Rubber compounding.
- Proven expertise in manufacturing process design and testing.
- Proven expertise in modifications to plant and equipment to meet new customer requirements.
- Reputation for on Time Delivery (OTD) to our extensive customer base throughout the world.
- Commitment to meeting the most stringent Quality standards.
- Company -Wide Commitment to meeting the highest standards of Customer service and Support.





Product

NRC offers a fully integrated product design and manufacturing process that offers our customers the following benefits:

- Complete in- house manufacturing process including yarn preparation, compounding, weaving, calendaring rubber to fabric and the ability to provide specific rubber covers, when required.
- A variety of woven fabric carcasses are designed to meet tensile strength requirements, operate efficiently and excellent fastener retention.
- Specific rubber compound covers provide optimum protection of the fabric carcass, while the fabric provides excellent longitudinal strength and transverse flexibility whether the conveyor system is empty or fully loaded.
- Ability to manufacture heavier covers on a variety of woven carcasses that offer longer wear, and more tonnage over the life of the belt.
- Molded edge belt design is available to protect belt edges and resists edge fraying.
- Excellent belt tracking on long center conveyors as well as multiple transfer points, both loading and unloading
- Each roll of belting is subjected to continuous in-process quality testing and must meet stringent final quality standards, both physical properties and MSHA Part 14 requirements.
- Each belt is Individually tested to pass the stringent standards set by MSHA.
- Products can be designed to conform to any country -Specific standards for use in underground mines as well as surface applications where there is a potential for fire.
- Products can be spliced by mechanical fasteners or by splicing using hot vulcanizing methods
- Excellent for a wide variety of applications by choosing the proper compound and fabric to match the operating conditions of the individual conveyor system.

Quality Assurance

Sharp attention focused on quality and continual in -process testing and controls are the basis of the excellent products that offer safe and efficient operation, NRC Products undergo on-going quality checks in its well - equipped laboratories and shopfloors, from incoming raw materials to finished products.

- Incoming raw material- yarns and chemicals are tested on arrival to verify the standards we established with our suppliers.
- Every finished roll is tested for conformity to physical property requirements established as our standard of excellence for every conveyor belt that is manufactured.
- Physical properties include width, thickness (belt & covers), tensile strength (Warp & weft), elongation (Warp & Weft), adhesion (cover to carcass and internal), fastener retention (static & dynamic), cover abrasion resistance, troughability, etc.
- FRAS tests include flame (finger burn), flame propagation (Mid-Scale/B.E.L.T), drun friction and antistatic (static conductivity) as required by MSHA, CSA and others.



Compound	Tensile Strength Min. (Mpa)	Tensile Strength Min.(Psi)	Elongation Min%	Application Grade						
MSHA-14	15	2100	400	MSHA 30CFR 14 (USA)						
MSHA-18	16	2200	400	MSHA 30CFR 18.65(USA)						
CAN-CSA-C	16	2200	400	CSA-C (Canada)						

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Fire Resistant Compounds

Special Features:

SCORF

M-14 is a specially compounded to meet the vigorous requirements of 30CFR14 for fire resistance and is approved by MSHA for use in underground coal mining. This Specially formulated compound also complies with OSHA requirement for static conductivity using testing standard ASTM D257. M-18 is a SBR fire retardant compound meeting the old MSHA 30 CFR 14.65 requirement for underground mining in the U.S.A. This is no longer accepted for use in underground coal mining in the U.S.A but is classified by ARPM as a class FR-2 fire resistant belt. CSA-C is a SBR fire retardant rubber compound meeting the Canadian CSA-C requirements for fire resistance. It also provides abrasion resistance and resistance to low temperatures. SCORF is an ARPM Class FR-2 fire resistant belt with moderate oil resistance accepted by MSHA under 30 CFR 14.65. It is recommended for typical applications of oil treated coal or grain industries requiring fire and oil resistance as well as static conductivity . The conveyor belts listed with fire resistant covers meet fire performance requirements such as USMSHA ,CSA, SABS, DIN and AS. Flame retardant conveyor belt is designed for the best service conditions for the mining and grain industries. It is suitable for mining , coal benefication plants, power plants, granaries. The different rubber compounds are available to meet the requirements of each particular industry.

2400

MSHA 30CFR

18.65(USA)

400

Product Range Summary

- Width-350mm to 2400mm (14" to 96")
- Type-150KN/m to 3500KN/m(90PIW to 2000PIW)
- Covers-All Kinds of cover types.
- Special Covers-Available for abrasion , oil resistance, load impact
- Roll Length -Long Roll Lengths possible
- Color-Black, White, Tan and orange.
- Special Weave Constructions Many Kinds of fabric constructions available.



Product Range certifications

Product Approvals & Certifications:

India

- ISO 9001 : 2008 Certified. Directorate General of Mines Safety (DGMS) Approval As per IS 3181:1992.
- ISO 14001 Certified`
 NABL Certified

United States of America

• Mine Safety and Health Administration approval as per US-MSHA, Title 30 of code of Federal Regulations (CFR)

Canada

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Canadian Standards Authority approval as per CSA-M422 Type C-1.

Chemical Compatibility Chart

This is a brief listing of our Chemical and Material compatibility list.

Chemical	Natural Rubber, Isoprene (NR,IR)	Styrene, Butadiene (SBR,BR)	Butyl (IIR)	EPDM, EPM	Nitrile (NBR)	Neoprene (CR)	Hapalon (CSM)	Silicone (SI,VMQ)	Viton, Flurorolastomer (FKM)
Ammonia Anhydrous	D	D	А	А	В	А	В	С	D
Ammonia Gas (cold)	А	А	А	А	А	А	А	А	D
Ammonia	D	D	В	В	D	В	В	А	D
Gas (hot)									
Ammonia Carbonate (Aqueous)	А	А	А	*	D	А	*	*	А
Ammonia Carbonate (Aqueous)	А	А	А	*	D	A	*	*	А
Ammonium chloride (Aqueous)	А	A	А	А	A	A	А		А
Ammonium Hydroxide	D	D	A	А	D	A	A	А	В
Ammonium Nitrate (Aqueous)	С	В	A	A	A	A	A	*	А
Ammonium Nitrite (Aqueous)	А	А	А	А	А	A	А	В	А
Ammonium Persulfate (Aqueous)	А	D	А	А	D	A	A	*	А
Ammonium Phosphate (Aqueous)	А	A	А	А	А	A	А	A	А
Ammonium Sulfate (Aqueous)	А	А	А	А	А	А	А	*	В
Amy/Acetate (Banana Oil)	D	D	С	С	D	D	D	D	D
Amy Alcohol	В	В	А	А	В	В	А	D	В
Amy Borate	D	D	D	D	А	А	А	*	А
Amy Chloronaptha	D	D	D	D	D	D	D	D	A
lene									
Amy/ Napthalene	D	D	А	А	D	D	С	D	С

 $A \rightarrow Excellent$ $B \rightarrow V. Good$ $C \rightarrow Good$ $D \rightarrow Fair$

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The Manufacturing Process

1. In the first step of manufacturing, i.e. mixing, the rubber (polymer) is mixed with fillers, additives, oil and other ingredients in a mixer. NRC adopts a computerised automatic weighing and batching system coupled with the 11-D Banbury mixer which ensures homogeneity of the process. The quality, quantity, sequence and mode of mixing are programmed as per the formula for a specific grade of belt, thereby achieving accuracy and consistency of the product. After mixing, the rubber sheets are festooned through a cooler-cum-stacker, where air is forced by external fans for the purpose of cooling. A sample is then drawn from each batch and tested for its rheological characteristics

and mechanical properties. It is ensured that each rubber compound passes this test for being allowed for susequent operations.

2. The productive rubber mix is passed through a hot feed extruder for better homogeneity of the mix. The rubber mix is further send to a four bowl calendar for skim coating on the pre-stretched fabric, carcass making and rubberising to produce a complete green belt.

A green belt up to a width of 2000 mm can be produced without longitudinal joints.





Four Bowl Calendar



Vulcanising Press (Double Deck)

The rubber sheets thus obtained are cooled over a conveyor. The assembly line also has an auto-centering device through which, the fabric & rubber sheets are let off, ensuring no lateral drift of these layers.

3. The assembled belt is cured in a vulcanising press. There are provisions for pre-cure and post-cure stretching of the belts. This stretching process increases the full belt tensile strength and also reduces elongation during its run at site.

Manufacturing Flow Diagram of Synthetic Fabric Re-inforced Belt (SFR)



Advantages and Construction



Higher Adhesion Levels NRC SFR belts have higher adhesion level compared to conventional belting available because of its special chemical bonding coupled with mechanical locking characteristics between cover to ply and ply to ply. These characteristics help to eliminate cover peeling & increase edge wear resistance, carcass consolidation and total elimination of ply separation.

Improved Troughing and Higher Capacity Utilisation

Higher transverse flexibility of NRC SFR belts as compared to conventional belts contribute to the users and conveyor designers the advantage like deep troughing of carcass, which increases volumetric transfer capacity and improves belt training at higher speed.

Lower Self Weight and Higher Ply Strength

The use of synthetic filament provides higher ply strength than conventional belting and therefore, NRC SFR belts can meet high tension requirement using less number of plies. This construction feature of NRC SFR carcass has advantages like low drive power requirement and higher idler life.

High Resistance to Impact and Mechanical Damages

Higher adhesion levels improve belt consolidation, thereby providing high impact resistance and eliminating cover stripping/gouging.

High Longitudinal Flexing Properties

The specially designed NRC SFR belts with comparatively thin carcass renders effective longitudinal flexibility for negotiating over smaller pulleys and for reduction of flex fatigue strain on the belt.





Standard Belt Construction

A conventional rubber conveyor belt consists of cover rubber & carcass made up of skim coated reinforcing fabric.

Cover Rubber

It protects the carcass from external abrasion & impact injuries. The covers are also designed to resist adverse service conditions.

Different cover grades are available depending on the application:

- General purpose
- Heat resistant
- Fire resistant
- Oil resistant
- Abrasion resistant
- Chemical resistant, etc.



Reference Elongation (%) Graph for EP and NN

Carcass

It provides the body to a belt. It is the tension & strength bearing member consisting of different textile materials namely Nylon and Polyester. The carcass is made of a number of plies bonded together with rubber compound specially designed to withstand rigors of application.

Polyester-Nylon (EP) fabric conveyor belt has the following advantages over Nylon-Nylon (NN) conveyor belt:

- Low elongation
- Short take up
- Better moisture resistance
- Low creep because of higher modulus

Edge Construction

NRC SFR belts are supplied in moulded edge/cut edge constructions. Synthetic fabric is rot and mildew resistant and therefore making it possible to manufacture belts in any edge construction as per requirement.

Rubber Skim Coat

A thin film of rubber layer placed in between the plies enhances the anchorage of rubber to fabric to facilitate the flex life augmented by elasticity. It further protects the carcass from impact damage & moisture ingress.

Breaker Fabric

Breaker fabric is recommended for critical application. It is placed between the cover and the carcass to improve additional anchorage through locking and to resist cover against gouging, stripping and tearing. It finds particular application where impact due to fall of lumps from greater height is experienced.



Cover Rubber

Standards Applicable

Conveyor belts manufactured by NRC conforms to IS : 1891 (Parts-I, II, III, V) and also to BS 490 (Part-I) DIN, Canadian Bureau of Mines, AS, JIS, MSHA, SANS and various other international specifications.

Range of Products

Width

Conveyor belts are offered in widths from 550 mm to 2400 mm. For lower width, i.e. 300 mm to 550 mm, we provide belts in equal length with cut-edge construction.

Tensile Strength & Type

Conveyor belts are manufactured in two types viz. heavy duty and extra heavy duty and such types are selected on the basis of various operating conditions like load support characteristics, impact, troughing angle, belt fatigue, etc. NRC is in a position to manufacture SFR conveyor belting of tensile strength up to 3000 kN/m and up to 9 ply construction (however, the standard range of belting upto tensile strength of 2500 kN/m is indicated in the belt selection tables).

Cover

Grades M-24 & N-17 are manufactured for general purpose belting conforming to abrasion loss characteristics as per IS-1891 when tested in line with DIN 53516.

Grades IS T1, IS T2, ultra heat resistant both are manufactured for various typical heat resistant applications.

NRC SFR belts with fire resistant (FR) grade of rubber covers are manufactured suitable for use in open cast, underground mines, thermal power stations, especially

where fire hazards exists. Special grades like oil resistant, superior abrasion resistant, chemical resistant, energy optimised belts (EOB) are also within standard range of products.

Heat resistant (HR) Matrix										
Sr. No.	S	ervice temperatur	Nomenclature	Plant						
	Minimum	Continous	Maximum	of HR belt	Fidit					
1	- 30	+ 80	+ 125	IS T1	All					
2	- 30	+ 125	+ 150	IS T2	All					
3	- 30	+ 150	+ 180	Т3	All					
4	- 30	+ 180	+ 220	T3(P)	All except steel					
5	- 30	+ 180	+ 240	T3(S)	All					



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Selec	Selection of Cover Rubber Quality									
0		Phy	sical Propertie	S						
Cover Type	Standard & Grade	Min. Tensile Strength (N/mm²)	Min. Elong. at Break (%)	Max. Abrasion Loss (mm ³)	Max. Temp. (°C)	Material	Characteristics			
	DIN X	25	450	120	80					
	AS M	24	450	125	80		Extra abrasion, cut & gouge			
	SANS M	25	450	120	80	Iron ore, copper ore, stone, rock, etc.	transporting sharp, large lumps			
pose	ISO H	24	450	120	80		& rugged material under adverse loading condition			
Purl	IS M-24	24	450	120	80					
eral	DIN Y	20	400	150	80					
Gen	AS N	17	400	200	80	Fine cool, ach	Abracian registance for normal			
	SANS N	17	400	150	80	cement, earth,	service. Suitable for transporting			
	ISO D	18	400	100	80	coal, salt, etc.	moderate abrasive material.			
	IS N-17	17	400	200	80					
erior asion stant	DIN W	18	400	90	80	Quarries, sandpits, lime stone, coal, ash, ore,	Superior abrasion resistance for the heaviest service condition.			
Sup Abra Resi	AS A	17	400	70	80	phosphate, raw material for glass works etc.	a large proportion of fines.			
ŧ	DIN T	12.5	350	250	125					
leat istar	IS T1	12.5	350	250	125	hot powder, chemicals &	Heat resistant and also in cut,			
Res	IS T2	12.5	350	250	150	fertilizers, etc.				
	AS F	14	300	200	80					
	CAN CSA-C	17	350	200	80					
ų.	ISO 340	17	350	175	80	Mataziala kasing fin	Desistance to flower means with			
stan	IS-FRAS	17	350	200	80	hazards e.g. sulphur, coal,	and burning; suitable for surface			
e Resi	DIN K (with cover)	20	400	200	80	etc.	application.			
Fir	SANS F	14	400	180	80					
	ISO K	15	350	200	80					
	MSHA	12	400	250	80	Explosive and fire hazardous material e.g. coa	Resistance to flame propagation, lextremly low burning rate: suitable			
	DIN V	15	350	200	100	powder, etc.	for underground operation.			
ease	DIN G	12	250	175	100	Chemical & fertiliser. wood				
& Gr esist	AS Z	12	250	175	100	paper & pulp, recycling	Resists penetration and therefore the damaging effect of oil and fat.			
® a IS OR	IS OR	12	250	175	100	piailts				

Special Cover Rubber from NRC

In Addition to the Standard Grades of Rubber Cover, Nrc Offers Special Cover Grades Suiting to a Particular Application.

		Pł	nysical Proper	ties				
Cover Type	N R C brand	Min. Tensile Strength (N/mm2)	Min. Elong. at Break	Max. Abrasion loss (mm3)	Max. Temp. (°C)	Material	Characteristics	
at stant	UHR	12.5	350	200	Max temp. handled 180 °C	Hot sinter, hot cement, fertilizer, etc.	Super heat resistant and also in cut,	
He Resis	UHR Super	10	300	200	Max temp. handled 240 °C	Hot clinker, hot cement, hot chemicals and fertilizer etc.	abrasion and tear resistant	
High wear and Tear Resistant	HWT	22	400	90	80	Quarries, sand & gravel. limestone, coal, ash	Suitable for high abrasive applications	
ed	M EOB	18	400	100	100	Fine coal, ash, cement,	General purpose premium quality energy optimized cover	
Energy ptimiz	LRR EOB 18		400	100	100	earth, coal, sait, etc.	General purpose energy optimized cover	
0	FR EOB	15	400	130	80	Explosive and fire hazardous materials, e.g. coal powder, etc	Fire resistant grade EOB as per FR CAN CSA-C	



Cover Element: Cover Rubber

Minimum Pulley Diameters (to DIN 22101)

The pulley diameters in a belt conveyor system depend on the design, on strains and on the type of splice of the conveyor belt.

The minimum pulley diameter (DTr min) Gr A for group A pulleys can be roughly determined by utilizing the thickness value of the tensile member in the belt i.e. d_{GK} as follows:

(D _{tr min}) _{Gr A} = (Material Characteristic Calue) (d _{GK})					
Tensile Member Material in Belt Longitudinal Direction	Material Characteristics Value				
E (Polyester)	108				
P (Polyamide)	90				

A pulley diameter so obtained shall be rounded up to the next higher standard pulley diameter (see tables below).

Carcass Thickness, Weight, Pulley Diameter

Nylon – Nylon (N-N)									
Designation		Max. Recommended Working Tension (Vulcanised Splice)	Nominal Carcass Thickness	Nominal Carcass Weight	Recomm Diam up to	ended Minimu eter (mm) Ove 100% of RMBT	m Pulley r 60% Used		
Туре	Rating	kN/m	mm	kg/m²	А	В	С		
	315/3	31	2.7	3.3	250	200	160		
à	400/3	40	2.8	3.5	315	250	200		
	500/3	50	3.1	3.7	315	250	200		
	500/4	50	3.8	4.6	400	315	250		
	630/3	63	3.8	4.7	400	315	250		
	630/4	63	4.1	4.9	400	315	250		
y Du	800/4	80	5.1	6.2	500	400	315		
leav	800/5	80	5.2	6.1	500	400	315		
Ŧ	1000/4	100	5.4	6.5	500	400	315		
	1000/5	100	6.4	7.8	630	500	400		
	1250/4	125	6.7	7.8	630	500	400		
	1250/5	125	6.8	8.2	630	500	400		
	1400/4	140	6.8	8.1	630	500	400		
	1600/5	160	8.4	9.7	800	630	500		
	315/3	31	3.6	4.5	400	315	250		
	400/3	40	3.8	4.6	400	315	250		
	500/3	50	3.9	4.8	400	315	250		
	500/4	50	5.1	6.1	500	400	315		
	630/3	63	4.4	5.5	400	315	250		
>	630/4	63	5.2	6.4	500	400	315		
Dut	800/4	80	5.9	7.3	630	500	400		
eavy	800/5	80	6.6	8.1	630	500	400		
Ta H	1000/4	100	6.5	7.6	630	500	400		
Exti	1000/5	100	7.4	9.1	800	630	500		
	1250/4	125	7.3	8.8	800	630	500		
	1250/5	125	8.2	9.5	800	630	500		
	1400/4	140	7.5	9.1	800	630	500		
	1600/4	160	8.3	10.1	800	630	500		
	1600/5	160	9.2	11.0	1000	800	630		
	2000/5	200	10.40	12.7	1000	800			

Polyeste	r – Nylon ((E-P)					
Designation		Max. Recommended Working Tension (vulcanised Splice)	Nominal Carcass Thickness	Nominal Carcass Weight	Reco Pul > 60%	ommended Min ley Diameters to 100% of RMI	imum (mm) 3T Used
Туре	Rating	kN/m	mm	kg/m²	A	В	С
	315/3	31	2.8	3.5	315	250	200
	400/3	40	3.1	3.6	400	315	250
	500/3	50	3.2	3.9	400	315	250
ð	500/4	50	4.1	4.9	500	400	315
	630/3	63	4.2	5.1	500	400	315
	630/4	63	4.3	5.2	500	400	315
/ Du	800/4	80	5.6	6.8	630	500	400
eav	800/5	80	5.4	6.5	630	500	400
Ŧ	1000/4	100	6.4	7.4	800	630	500
	1000/5	100	7.0	8.4	800	630	500
	1250/4	125	7.0	8.6	800	630	500
	1250/5	125	8.0	9.2	1000	800	630
	1400/4	140	8.3	9.5	1000	800	630
	1600/5	160	8.8	10.8	1000	800	630
	315/3	31	3.6	4.7	400	315	250
	400/3	40	3.8	4.8	500	400	315
	500/3	50	4.0	5.1	500	400	315
	500/4	50	5.1	6.4	630	500	400
	630/3	63	4.6	5.8	630	500	400
	630/4	63	5.3	6.8	630	500	400
~	800/4	80	6.2	7.8	800	630	500
Dut	800/5	80	6.7	8.5	800	630	500
avy	1000/4	100	7.0	8.4	800	630	500
a He	1000/5	100	7.8	9.7	1000	800	630
Extr	1250/4	125	7.8	9.6	1000	800	630
	1250/5	125	8.8	10.5	1000	800	630
	1400/4	140	8.9	10.6	1000	800	630
	1600/4	160	9.6	11.6	1250	1000	800
	1600/5	160	9.8	12.1	1250	1000	800
	2000/4	200	13.4	15.5	1600	1250	1000
	2000/5	200	12.0	14.5	1400	1250	1000
	2500/5	250	16.8	19.4	2000	1600	1250

The above figures are approximate values and should be take into account for design prupose. NRC reserves the right to change these values and parameters without notice in tune with the technological development.

Note:

Types of Pulley

- A: Driving pulleys and pulleys exposed to high belt tension.
 - B: Deflection pulleys in the range of low belt tension.
 - C: Snub pulleys for a change of direction of the belt of less than 30°.
- Weight of rubber cover (kg/m2 per mm thickness)

M24, N17	1.11
IS T1, IS T2	1.14
FR	1 26

For other special grades of rubber cover, please contact NRC

• The first set of figures in the belt strength designation represents the full thickness tensile strength of the belt

- in kN/m width and second set of figure represents the number of fabric plies in the belt.
- Minimum 3 ply belt construction is recommended for conveyor belt application. 2 ply belt can be used for bunker sealing and light duty conveyor.
- The above values are for standard range of NRC SFR conveyor belts but against specific requirements, other constructions can be specially designed and manufactured. In case of specification not listed above, please contact NRC for detailed information.
- For machine belt, use of polyester reinforcing member is recommended best.
- Heavy duty conveyor belts are suitable for most of the conveyor applications.
- Extra heavy duty conveyor belts are recommended for use in extreme operating conditions.





Load Support Table									
Belt Rating	Minimum Belt Width for Satisfactory Troughing		Maximum Belt Width for Satisfactory Load Support in mm						
kN/m	35°	45°	Up to 1 T / m ³	Overnf to 1.6 T Over 1.	6 too³2.5 T				
315/3	500	600	1200	1000	800				
400/3	500	600	1200	1050	900				
500/3	500	600	1400	1200	900				
500/4	500	600	1400	1200	900				
630/3	600	650	1400	1200	1050				
630/4	600	650	1600	1400	1200				
800/4	650	800	1800	1600	1400				
800/5	750	800	1800	1600	1400				
1000/4	650	800	1800	1600	1400				
1000/5	800	1000	2000	1600	1400				
1250/4	800	1000	2000	1800	1600				
1250/5	900	1050	2000	1800	1800				
1400/4	1000	1200	2000	1800	1800				
1600/4	800	1050	2000	2000	2000				
1600/5	1000	1200	2200	2000	2000				
2000/4	1050	1200	2000	2000	2000				
2000/5	1050	1200	2400	2200	2000				
2500/5	1050	1200	2400	2400	2200				



NRC INDUSTRIES LTD.



Vertical Curves

With concave belt tracking, the radius of the curve is usually so measured that the conveyor belt in each operating and loading condition lies on the idlers, especially on the center idler.

$$R_{amin} = \frac{F_{Tmax}}{g.m'_{G} \cdot \cos\delta}$$

- $\mathsf{F}_{_{\mathsf{Tmax}}}$ maximal occurring belt forces in the curve in Newton
- δ local incline
- m'_{G} weight of conveyor belt in kg/m
- $R_{\mbox{\tiny amin}}$ Minimum radius of curvature in meter

Smaller radii of the curves are possible if a lifting off the idlers is allowed with an unloaded conveyor belt under certain operating conditions. In this case, constructive measures, e.g. intercepting idlers, are required in the area of this conveyor section.

Convex Curves

Belt Width B	Radius Re in Mat Troughing Angle λ of the Belt							
in mm	30°	35°	40°	45°				
500	9	11	12	13				
650	13	14	16	18				
800	15	17	20	21				
1000	19	22	25	27				
1200	23	26	30	33				
1400	27	31	35	38				
1600	31	36	40	44				
1800	35	41	45	50				
2000	39	45	50	55				
2200	44	50	56	62				
2400	47	54	60					

The guide values as stated in the above table for the radii required at a minimum when the belt is tracked in convex curves apply for 3-part equal length idler arrangements. With a view to their higher strain in curve areas, these should be arranged at a reduced spacing, if necessary.





Guide values for the trough-to-flat transition length Lu required at a minimum (quoted in mm) for 3-part idler arrangements with idlers of equal length for textile-carcass conveyor belts.

Trough to Flat

Textile Carcase	Textile Carcass Belts Without Pulley Lifted, i.e. h = 0									
Belt width B	Troughing angle∖ of the belt									
in mm	25°	30°	35°	37.5°	40°	45°				
500	510	610								
650	680	950	1010							
800	820	990	1150	1230	1310					
1000	1060	1260	1470	1570	1670	1870				
1200	1250	1500	1740	1860	1980	2220				
1400	1480	1780	2060	2210	2350	2630				
1600	1710	2040	2370	2540	2700	3020				
1800	1930	2310	2680	2870	3050	3410				
2000	2130	2550	2970	3170	3370	3780				
2200	2390	2860	3320	3550	3780	4230				
2400	2560	3060	3560	3810	4050	4530				

Textile Carcass Belts Without Pulley Lifted, i.e. $h \neq 0$ (Values for h in mm in Brackets)

Belt Width B	Troughing Angle λ of the Belt											
in mm		25°		30°		35°	35° 37.5		7.5° 40°		45°	
500	(20)	350	(25)	350								
650	(25)	480	(33)	550	(35)	660	(40)	685				
800	(35)	550	(40)	665	(45)	780	(50)	850	(50)	890		
1000	(40)	750	(50)	780	(60)	980	(60)	1075	(65)	1130	(70)	1280
1200	(50)	850	(60)	1015	(70)	1170	(75)	1240	(80)	1315	(85)	1500
1400	(60)	1000	(75)	1170	(85)	1365	(90)	1460	(95)	1555	(100)	1780
1600	(70)	1140	(85)	1350	(95)	1590	(100)	1710	(105)	1695	(115)	2040
1800	(80)	1290	(95)	1535	(105)	1820	(115)	1910	(120)	2050	(135)	2265
2000	(90)	1410	(105)	1700	(120)	1980	(125)	2135	(135)	2245	(145)	2540
2200	(100)	1590	(115)	1930	(135)	2210	(140)	2390	(150)	2525	(165)	2825
2400	(105)	1720	(125)	2050	(145)	2365	(150)	2560	(160)	2710	(175)	

Splicing

NRC SFR conveyor belts are jointed in stepped plies with hot vulcanization method. Following tables describe the technical parameter.

Belt Rating	Breaking Strength of 1ply (N/mm)	Step Length LS (mm)	Splice Length L, (mm)	Number of Steps
315/3	80 -100	150	300	2
400/3			400	2
500/3	125 –160	200	400	2
630/4			600	3
800/4			750	3
1000/5	200 – 250	250	1000	4
1250/5			1000	4
1600/5	245 400	200	4000	
2000/5	315 - 400	300	1200	4
2500/5	500 620	250	1400	4
3150/5	500 - 630	330	1400	4



One end of a 5 ply belt stepped down for splicing

For the ramp strip a surplus of 50 mm must be taken into account for the splice length.

Extra Length of belt required for splicing

- = 0.3W + LS (n-1) + 50 mm
- where, W = Width of belt in mm
- n = No. of plies
- LS = Step length in mm

If the belt rating is not found in this table, the necessary splicing length can be calculated in the following way: calculate the breaking strength of one ply by dividing the belt rating by number of plies. For this value the necessary step length can be taken from the table.

Vulcanizing Conditions

(i) Time							
Belt Thickness (mm)	Time (min.)	Cooling up to (°C)					
Up to 10	25						
Over 10 up to 12	30						
Over 12 up to 15	36						
Over 15 up to 17	42	70					
Over 17 up to 20	48	70					
Over 20 up to 22	53						
Over 22 up to 25	60						
Over 25 up to 30	70						

(ii) Temperature:	150 ± 5°C
(iii) Specific pressure:	10 kg / cm2

Splicing Materials per kit	
Cover Compound 1.6 mm x 175 mm x 4.5 mts.	1.5 kg
Insulation compound.8 mm x 175 mm x 8 mts.	1.5 kg
Solution	

Recommendations

Splicing materials should be stored in a cool, dry place at a temperature around 18°C.



Reel Diameters (m)

Reel diamet	ers															
Belt	Belt thickness in mm															
in mm	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
10	0.61	0.63	0.65	0.67	0.69	0.71	0.73	0.75	0.76	0.78	0.79	0.81	0.83	0.84	0.86	0.87
20	0.71	0.75	0.78	0.81	0.84	0.87	0.90	0.92	0.96	0.98	1.01	1.03	1.06	1.08	1.10	1.13
40	0.87	0.93	0.98	1.03	1.08	1.13	1.17	1.21	1.25	1.29	1.33	1.37	1.41	1.44	1.48	1.51
60	1.00	1.08	1.15	1.21	1.27	1.33	1.39	1.44	1.50	1.55	1.59	1.64	1.69	1.73	1.76	1.82
80	1.13	1.21	1.29	1.37	1.44	1.51	1.58	1.64	1.70	1.76	1.82	1.87	1.93	1.98	2.03	2.08
100	1.23	1.33	1.43	1.51	1.59	1.67	1.75	1.82	1.87	1.95	2.02	2.08	2.14	2.20	2.26	2.31
120	1.33	1.44	1.54	1.64	1.73	1.82	1.90	1.98	2.05	2.13	2.20	2.27	2.33	2.40	2.46	2.52
140	1.43	1.55	1.66	1.78	1.86	1.95	2.04	2.13	2.21	2.29	2.37	2.44	2.51	2.58	2.65	2.72
160	1.51	1.64	1.76	1.87	1.98	2.08	2.17	2.27	2.36	2.44	2.52	2.60	2.68	2.75	2.83	
180	1.59	1.73	1.86	1.98	2.09	2.20	2.30	2.40	2.49	2.58	2.66	2.75	2.84			
200	1.67	1.82	1.95	2.08	2.20	2.31	2.42	2.52	2.62	2.72	2.81					
220	1.75	1.90	2.04	2.17	2.30	2.42	2.53	2.64	2.74	2.84						
240	1.82	1.98	2.13	2.26	2.40	2.52	2.67	2.75								
260	1.89	2.05	2.21	2.36	2.49	2.62	2.74									
280	1.95	2.13	2.29	2.44	2.58	2.72	2.84									
300	2.02	2.20	2.37	2.52	2.67	2.80										
320	2.08	2.27	2.44	2.60	2.75											
340	2.14	2.33	2.51	2.68	2.84											
360	2.20	2.40	2.58	2.75												
380	2.25	2.46	2.65	2.82												
400	2.31	2.52	2.72													

Maximum weight of reel: 15 ton Maximum height of reel: 3.0 m





Troughability Test



Testing

NRC laboratory is equipped with the most modern testing facilities to meet excellence in product quality and international standards right from raw material to finished product. Some of the important facilities include:

Rheometer

Rheological behaviour of 100 per cent batch of rubber mix is studied prior to release for production. Cure rate index, plasticity and optimum cure time are determined by this machine.

Universal Testing Machine

Equipped with printer 10T tester is used for determination of tensile strength and elongation.

Drum Friction Testing Machine

Drum friction test rig attached with different gadgets is used to determine the fire resistance behaviour of conveyor belt.

• Abrasion Testing Machine

Resistance to abrasion behaviour is determined by this machine.

Electrical Resistivity Tester

The antistatic property is determined by ring electrodes.

Multi Cell Ageing Oven With Microprocessor
 Based Temperature Controller

It is used to determine the ageing characteristics of finished products.

Flame Test









Service and Maintenance

Service

NRC Offers You:-

- The very latest international technology, indigenously available at your doorstep.
- The benefit of a constant update on improvement of technology in bulk handling.
- The highest level of quality with the consistency and reliability, true to the spirit of ISO 9001 and ISO 14001 certification.
- The solution to your material handling needs at the concept stage itself.
- A dedicated design for every conveyor project to ensure ultimate cost-benefit of your investment.
- The services of international class towards optimum design and selection of belts, maintainability of belts, solution of conveyor problems, modernization of conveyors.
- The services for conveyor belt laying, splicing and commissioning.



Maintenance

The following suggestions are offered to derive the best services of a textile conveyor belt:

- Loading at the centre of the belt.
- Cleaning of belt by scrapers.
- Installing training idlers on carrying and return run to avoid belt-hits on the structure.
- Early repair of cover damages.
- Using skirt board with special rubber and not from old belt.
- Maintaining an edge clearance of 75 mm for belt edge from structure.
- Maintaining correct transition distance.

For details on splicing, troubles and corrective actions, please refer to our operation and maintenance (O&M) manual.



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Inspection, Packing Storage & Transportation

Inspection

Each belt roll is thoroughly inspected before shipment, even after thorough in- process and quality checks during the manufacturing process. Inspection includes dimensional stability, roll heights, and the absence of telescoping.

Ozone

As ozone can be particularly damaging to vulcanized rubber, storage rooms should not contain any equipment capable of generating ozone such as high voltage electrical equipment, electric motors or other equipment which may give rise to electric sparks or electrical discharges. Combustable gases and organic vapors should be avoided as they may give rise to ozone via photochemical reactions.

Packing

Belt rolls, after inspection and QC release, are packaged property to withstand the rigors of long shipment with multiple transfers of loading and unloading on trucks, containers, and ocean going ships, etc. Each roll is properly marked inside and outside the packaging for easy identification and traceability.

Storage

Proper care is taken to ensure that before the actual shipment, the packaged belt rolls are properly protected from the weather and other environmental factors. storage locations are at a convenient height for easier handling but clear of any water, dirt, or other contamination.

Transportation

Belt rolls typically face long shipping distances by road, by sea and again by road or rail until they reach their final destinations. In between there can be additional loading and unloading at warehouses before the reels reach customer locations. we pay special attention to the selection of quality transporters and shippers for damage free fast transit.

Packaging

Belting requiring long term storage should be bound with steel or high tenacity plastic or textile straps and protected with waterproof plastic material. A supporting center core of suitable dimensions manufactured from wood or steel should be specified at the time of order. Keep the belt packing on as protection from oils, solvents, corrosive liquids ,ozone, sunlight, and other adverse weather effects . When stored on flat surfaces, make sure to rotate the rolls periodically to prevent flat sports developing in the belts. for long term storage, belt stands that keep the belt off the ground are recommended storage method.

NRC - Fabric Weaving and Dipping Plant

We have our own fabric weaving and RFL Dipping plant to ensue that the material for the carcass is available at the shortest possible time. It is evident that the customer gets a top quality synthetic fabric reinforced conveyor belt with a much reduced delivery period than is otherwise available from other sources and at a very competitive price.

We weave from twisted yarns of the highest quality NN and EP fabric of width upto 1600 mm and weight upto approximately 1500 grammes per square metre and strength upto 450 KN/Metre. The Yarn tension control device ensures that bagginess of the fabric is eliminated. The looms are most modern and precise and are automated.

The Woven fabric is subjected to stringent tests before being transferred to the conveyor belt manufacturing unit.

NRC INDUSTRIES LTD.

Technical Data

Material Flow	Conveying speed v Mass flow I _m Volume flow I _v Degree of uniformity of mass or volume flow Load coefficient	₋ m/s ₋ t/h ₋ m³/h -
Properties of	Designation of the material handled Bulk density ρ Angle of repose β Temperature permanent °C min°C max	- _ t/m³ _ ° °C
Handled	Max. lump size Chemically corrosive Sharp-edged Wet	mm - 🛄 - 🛄
	Feeding direction- in longitudinal direction – in tranverse direction Height of fall	- 🛄 - 🛄
Material Feed	Garland idlers Troughing angle ° Impact idlers Feeding device (impact plates or similar) Chute constriction Length of constriction	- 🗔 - m
Material discharge	Via head pulley Tripper car Scraper	-
Conveyor Belt	Width B Endless belt length Support on top run: on carrying idlers Support on return run: on carrying idlers with support rings sliding	- mm - m - □
	Carrying idler arrangementpart Troughing angle λ_{o}	_ o
Idlers	Spacing I _o	- m
– Top Run	Mass (rotating components of an idler set) m _{Ro} Diameter d _{Ro} Tilted position	. kg ₋ mm -
	Flat-to-trough transition length I_0 mm Pulley lift h_{T^r}	_ mm
	Trough-to-flat transition length $I_{\hat{U}}$ mm Pulley lift h_{T^r}	- mm
	Return idler arrangementpart Troughing angle λ Spacing I	_ ° _ m
– ReturnRun	Mass (rotating components of an idler set) m _{Ru} Diameter d _{Ru}	kg ₋ mm
	Tilted position	-



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Та	Conveying direction Head	
FTr4	$F_{T3/4}$	
Pulleys Driven/Braked	Diameter D _{Tr} : 1, 2, 3, 4 Angle of wrap : α ₁ , α ₂ , α ₃ , α ₄ Pulley surface : bare Condition : dry	- mm ° □
Drives	Number of drives at Pulley 1: Pulley 2: Pulley 3: Pulley 4: Power - installed P _{M inst} Pulley 4: P (total) - estimated P _{M inst}	
	other large determines(related to the motor torque in the steady operating state at rated mass flow): π_{A0} (related to the rated motor torque):Start-up-time t_A	
Braking	Number of brakes on Pulley 1: Pulley 2: Pulley 3: Pulley 4: Total braking torque (related to the motor shaft) Pulley 3: Pulley 4: Braking factor π_B (related to the motor torque in the steady operating state at rated mass flow): π_{B0} (related to the rated motor torque): Braking distance s. m	Nm
Takeup Device	Takeup pulley – flying – fixed Takeup device at System head System ta Existing takeup length	ail
Conveyor Belt Cleaning	Scraper Other devices Belt turnover Further details	-
Conveyor Belt Type	New system Projected design Extension Required design Replacement Previous design Suitability satisfactoryyes	- - 0
Conveyor Belt Splicing	In-situ curing Mechanical fastener Delivery open Endless Endless	_

NRC INDUSTRIES LTD.

Notes

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