

NT Handrails

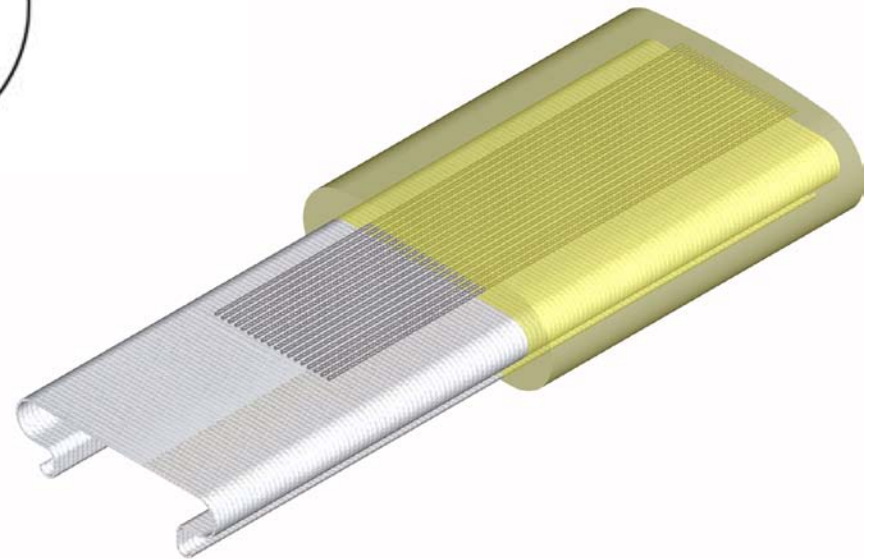
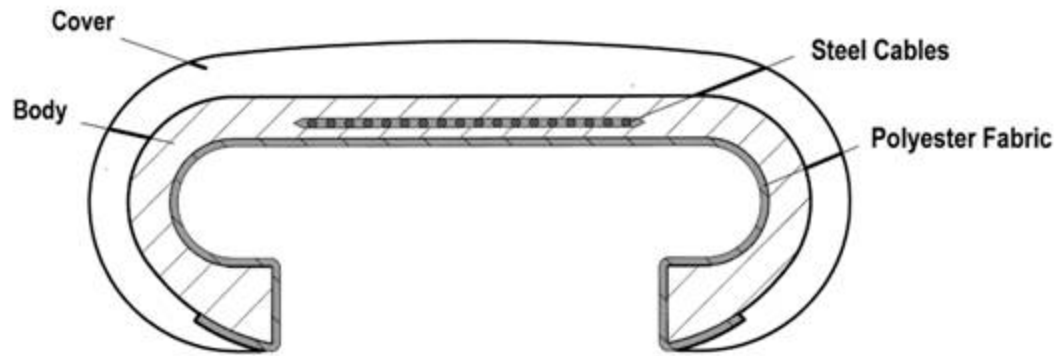
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NT Overview:

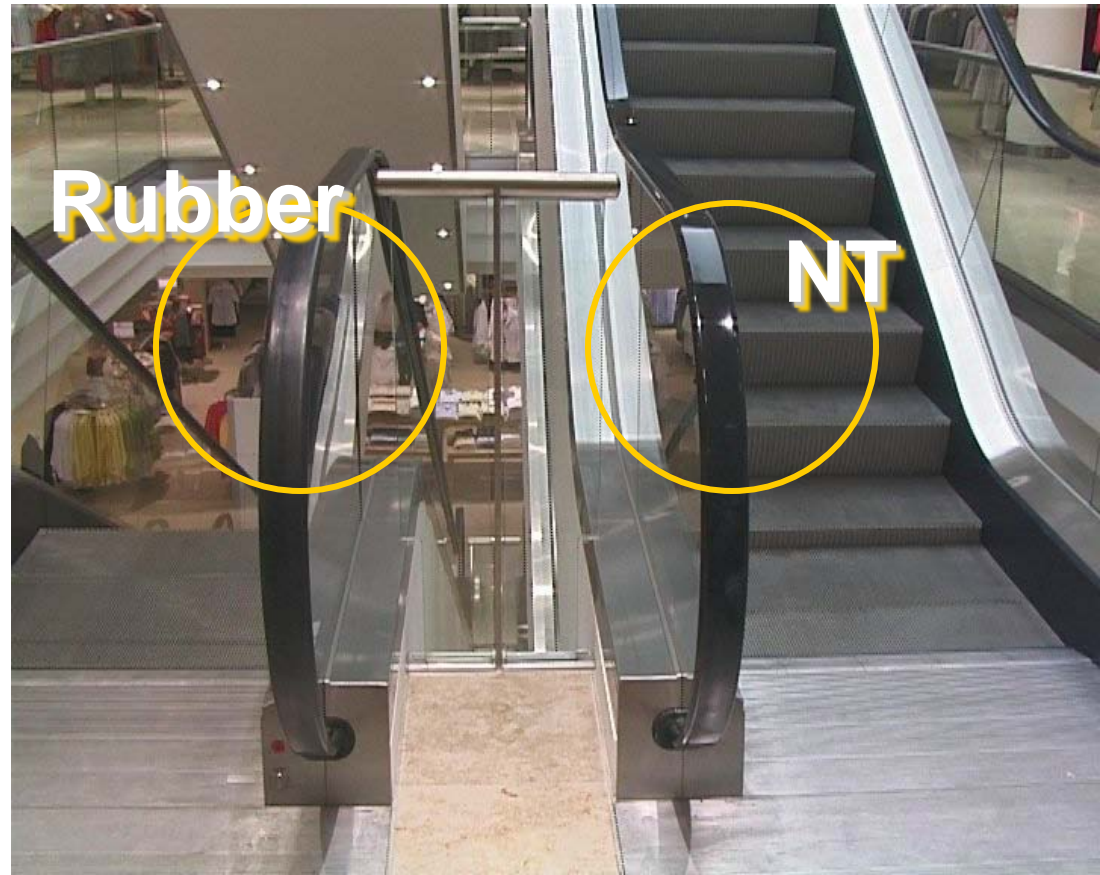
- NT is an entirely new concept in handrail technology that uses an extrusion process to combine thermoplastic elastomers with steel cables and slider fabric into a virtually homogenous product that will not delaminate
- The new materials and manufacturing process that give NT improved performance over the multiple plies of a conventional, mould-cured, rubber handrail also makes it look and feel somewhat different
- It is very glossy and looks much cleaner and inviting for the rider to touch. To protect this surface during shipping and installation it is supplied with a protective film that can be left on until the handrail has been installed and adjusted, or even longer if necessary until the unit is commissioned
- The glossy surface is a bit harder than a rubber handrail but feels pleasant to the touch and gives the rider a firm grip
- The NT is stiffer than most rubber handrails when being installed and it is recommended that the following directions for installation be followed to compensate for this difference

NT Construction



Why Use NT Instead Of Rubber?

- NT excels in ways that conventional rubber handrails can fail
- Physical properties of NT are superior to rubber
- Commercial properties of NT offer more options than rubber handrails

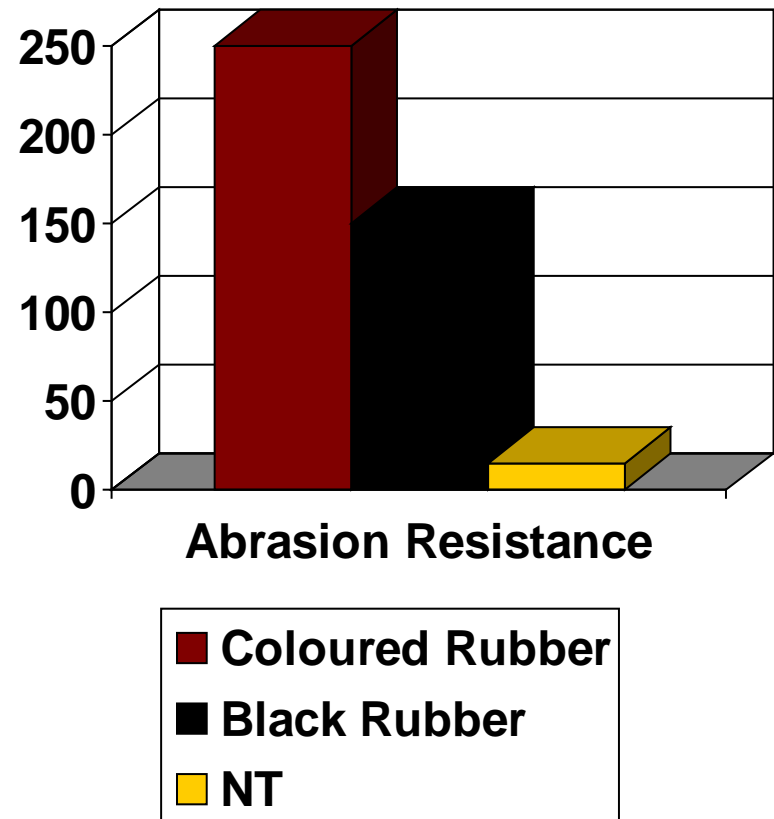


Physical Properties Of NT Are Superior To Rubber

- Tough outer cover
 - ✓ Withstands damage from vandalism
 - ✓ High abrasion resistance – the handrail will retain its surface properties longer than rubber
 - ✓ Lower toxic emissions and smoke density than conventional handrail
- Dimensionally stable
 - ✓ High lip strength throughout handrail life – improves safety, handrail will not come off guides easily. Rubber handrail lips can ‘grow’ causing a trapping hazard

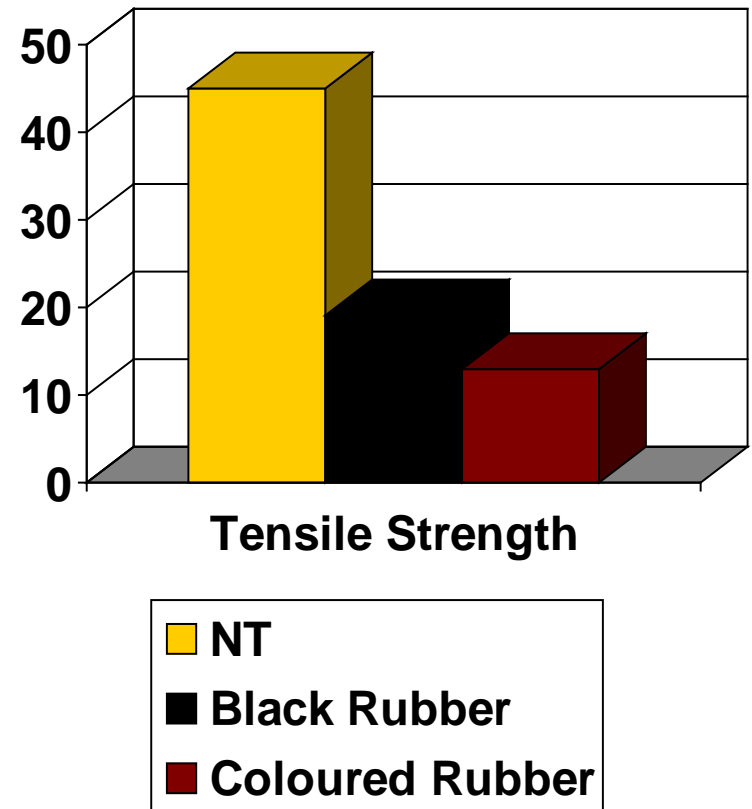
Abrasion Resistance

- NT's high abrasion means the cover can withstand damage due to vandalism and rubbing against other escalator components
- Resistance is measured by weighing the amount of material worn from pressure against an abrasive disc or drum
 - The lower the weight lost, the higher the abrasion resistance



Tensile Strength of Cover Material

- Toughness relates directly to the tensile strength of the material
- NT is constructed using the elastomer with the highest tensile and tear strength available
- NT's cover material has more than twice the tensile strength of a rubber handrail (making it difficult to tear or damage the handrail, improving handrail life)



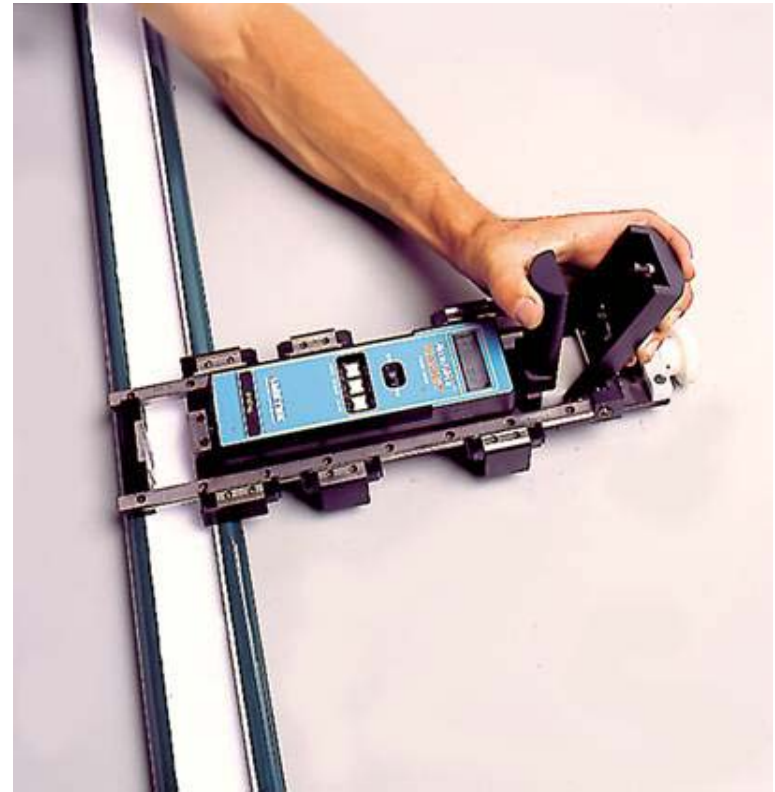
Straightness

- Extremely straight:
 - ✓ easier to set-up and maintain
- Handrail tracks better through drive system
 - ✓ leading to improved handrail and component life

Straightness	Rubber	NT
Deviation of stretch inhibitor from central axis	±3mm	±0.25mm

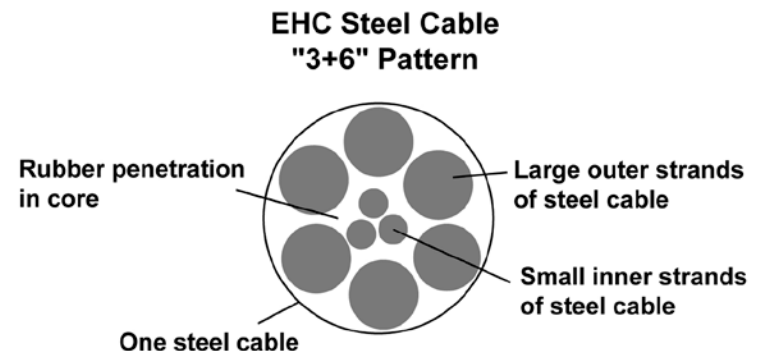
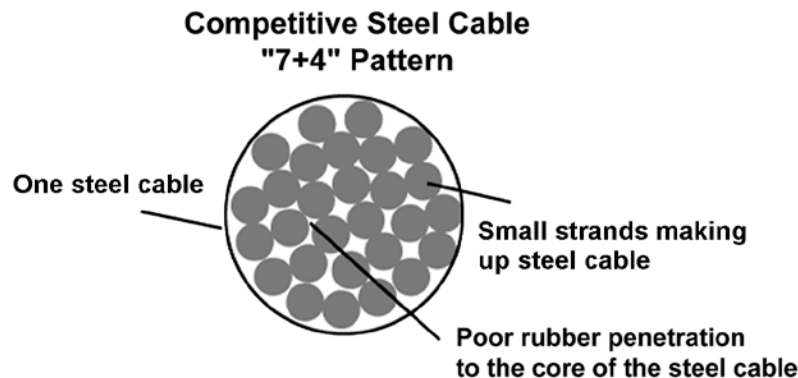
Lip Dimension & Strength

- If handrail lips grow, the handrail can come away from the guide making an area where fingers or a hand can get entrapped
- **Lip Dimension**
 - over time, the lip dimension of rubber handrails increases
 - NT handrail lips will not grow or shrink
- **Lip Strength**
 - NT starts with a high lip strength and maintains that strength over time
 - Because NT is not a layered composite of rubber and fabrics, it is not prone to loss of lip strength during service



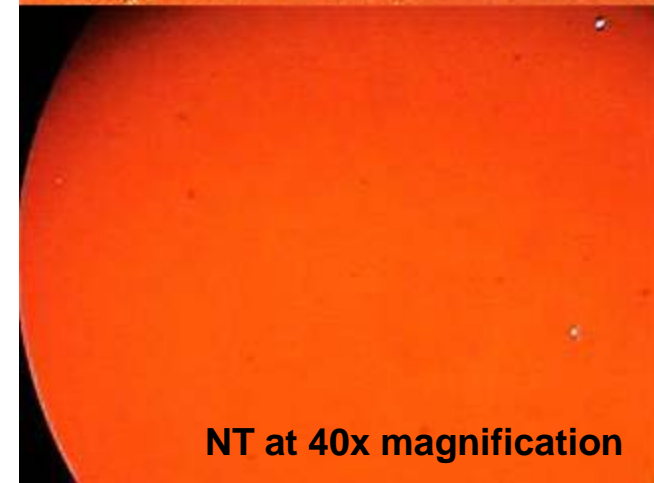
Stretch Inhibitor

- Both rubber and NT handrails use the same stretch inhibitor
- Fretting of the steel cable can occur if the individual wires are not protected from each other by rubber. If fretting occurs, the handrail may shrink.
- EHC steel cable allows excellent rubber penetration, providing the ultimate protection against fretting and corrosion
- With NT, the hard abrasion resistant carcass completely penetrates and protects the cables and the high adhesion results in a product that is very resistant to length change



Commercial Properties Of NT Are Superior To Rubber

- Sleek, shiny surface
 - ✓ Colours will not dull or get dirty like rubber
 - ✓ Cover does not bloom like black rubber
- Easy to clean
 - ✓ Will not trap dirt or grease
 - ✓ No polishing required
 - ✓ Can be cleaned with common (non abrasive) household cleaners
- ACCENT = new handrail options
 - ✓ Available with an optional antimicrobial additive
 - ✓ Available in unlimited, custom colours



Glossy Surface

Test Type		Conventional	NT
Gloss	Gloss on a 60° Minolta glossmeter	60	95

- NT handrails will stay glossy and vibrant through regular care
- The glossy surface of NT makes it more appealing for passengers to hold the handrail than a rubber handrail



Narita Airport, Tokyo

Easy To Clean

- NT's glossy surface can be maintained with common, non-abrasive cleaners
- We recommend any locally available window or glass cleaner or EHC handrail cleaner



No Polishing Required

- Unlike rubber handrails, NT does not require polishing, however, if desired, the occasional application of EHC Handrail Polish or an available liquid furniture polish can enhance the gloss of NT
- We do not recommend the use of any product in the belly or on the fabric of any handrail
- The use of belt dressings or waxes is not necessary and should be avoided as they will decrease drive efficiency and possibly damage the handrail, voiding your warranty

ACCENT – A New Product Line From EHC



innovative handrail technology that conveys, protects & informs

ACCENT

- ACCENT allows you to customize your handrails - thanks to EHC's patented NT technology
- Handrails have essentially been manufactured the same way for 100 years - using rubber technology
 - ✓ EHC has engineered a new manufacturing process so that you can offer your customers something really new & get their attention

ACCENT appeals to your customers:



**Airports, Building Owners,
Convention Centers, Interior
Designers, Architects, Casinos,
Shopping Malls, Department
Stores, Sports Stadiums, Transits**

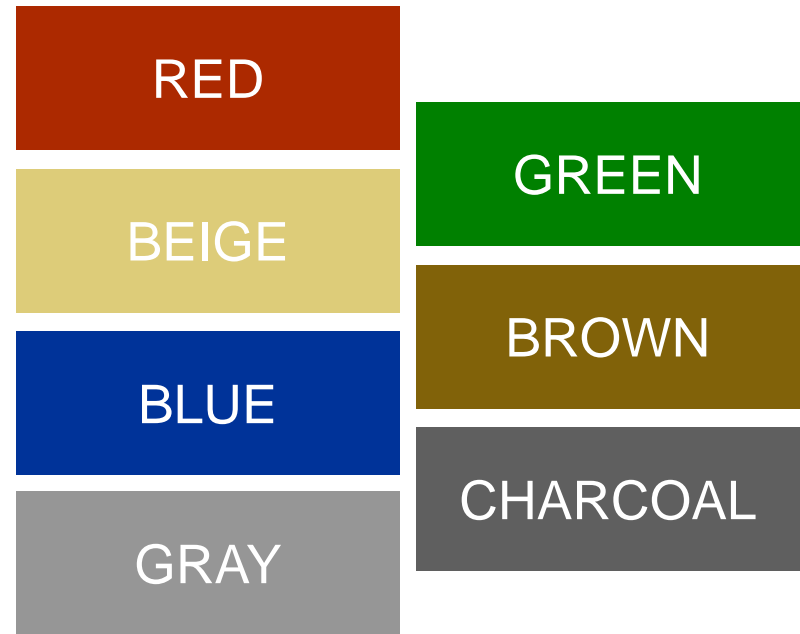
ColourRail - Custom Colours

- EHC can match ANY colour
- Colours are virtually unlimited
 - ✓ an architect's dream!
- NT colours look great for the life of the handrail
 - unlike rubber which can get dull and dirty



ColourRail - Standard Colours

- NT is available in black & 7 standard, stock colours:
 - ✓ Red
 - ✓ Beige
 - ✓ Blue
 - ✓ Gray
 - ✓ Green
 - ✓ Brown
 - ✓ Charcoal



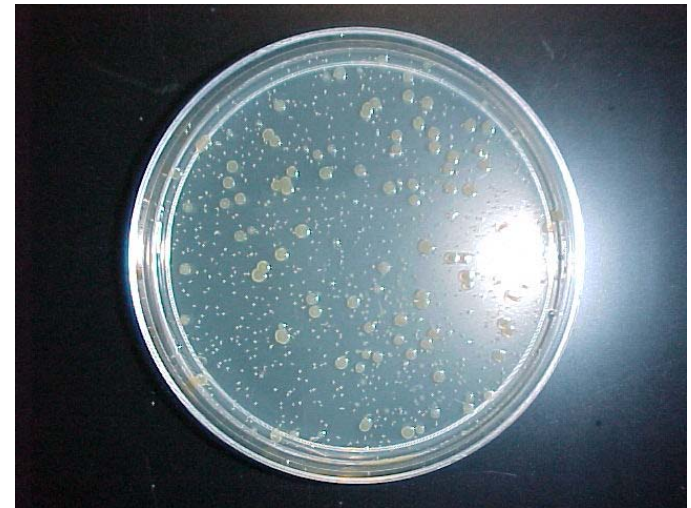
AMRail – Antimicrobial Handrails

- AMRail features built-in antimicrobial protection
 - ✓ Inhibits the growth of bacteria on escalator handrails
 - ✓ PERMANENT protection for the life of the handrail
 - ✓ Less maintenance or aggressive cleaning required
 - ✓ The most effective way to keep escalator handrails clean



Some Things Are Worth Protecting

- Handrails are important for escalator passenger safety
 - ✓ holding the handrail is one of the best ways to defend against accidental falls
- *When was the last time you wanted to hold a handrail?*
 - ✓ 75% of consumers are concerned about daily exposure to bacteria
 - ✓ 71% said products with antimicrobial protection are worth paying more for



NT In Action – OEM Approved

Airports

- Calgary, Canada
- Changi, Singapore
- Chubu (Nagoya), Japan
- Fukuoka, Japan
- JFK, USA
- LAX, USA
- Memphis, USA
- Narita, Japan
- Newark, USA
- San Francisco, USA
- Sapporo, Japan
- Vancouver, Canada

Transits

- Guangzhou, China
- Japan Rail West, Japan
- Monaco
- Munich, Germany
- New York, USA
- Paris, France
- Pusan, South Korea
- Seoul, South Korea
- Tokyo Metro, Japan
- Tsukuba Express

Plus other prestigious sites: CNN Headquarters, Atlanta; Harrods, London; Blue Water Park, Essex; Expo Center, Frankfurt; El Corte Ingles, Spain

Installation

NT Protective Film

- To protect NT's glossy finish during shipping and installation it is supplied with a protective film
- This film should be left on until the handrail has been installed and adjusted
 - The film can be left on even longer if necessary until the unit is commissioned



Handrail Tension – Escalators

- The higher initial stiffness of the NT means that it will not conform to the various curves and rollers of the escalator as easily as the more flexible rubber product
 - This is particularly noticeable on the return run
- To ensure that the new NT handrail follows the correct path, it should generally be installed somewhat tighter (10 – 15% more) than conventional rubber handrails.
- The stiffness of the new handrail will diminish after it has been running for several days

Escalators with Rolled Newel Ends

- If the escalator has rolled newel ends, the tension can be checked by running the handrail in the up direction and pulling the handrail away from the newel at the bottom end
- We recommend approximately 5mm (1/4") of slack at the newel
- This technique can only be used if the newel ends do not also incorporate guide or restraining components

Escalators with Guided Newel Ends or Continuous Guides

- If the escalator has continuous guides, the escalator should be stopped and then while standing at the bottom curve, grip the handrail and try to push it up and down the escalator
- There should be approximately 5-10mm (1/4" to 3/8") of total movement

Handrail Tension – Moving Walks and Ramps

- For very short walks and ramps (less than 40m handrail length) use the escalator methods described in the previous section
- For longer units you must set up the handrail tension in the normal manner according to the escalator manufacturer, and then increase tension by 10-15%. Then you must run the unit in both directions, paying careful attention to any accumulation of slack at the exit side of the drive
- If the handrail does not track smoothly over the drive exit rollers, then increase handrail tension and test again, ensuring that the rollers are all making contact with the handrail. Drive the unit in both directions for at least one full revolution. Inadequate handrail tension can cause serious damage to handrails and drive components
- As stated above, the handrail slack adjustment should be set so that the handrail fits tightly at first. The handrail will appear to loosen up over the first few days. This is normal and is just the handrail becoming more flexible. This is why it is important to have initial installation tension 10-15% higher to avoid the need for re-adjustment within the first few days of operation

Handrail Drive Set Up

Reverse Bend Escalators:

- No special setup should be required for most reverse bend type drives and the drive pressure device should be adjusted to the manufacturer's specifications
- We also recommend that the drive sheave be checked to see that it has not become polished as this may cause handrail slippage
- If the drive sheave is old or polished, it is our recommendation that the sheave be replaced with a new one with a polyurethane traction surface with a hardness of 80° to 90° Shore A

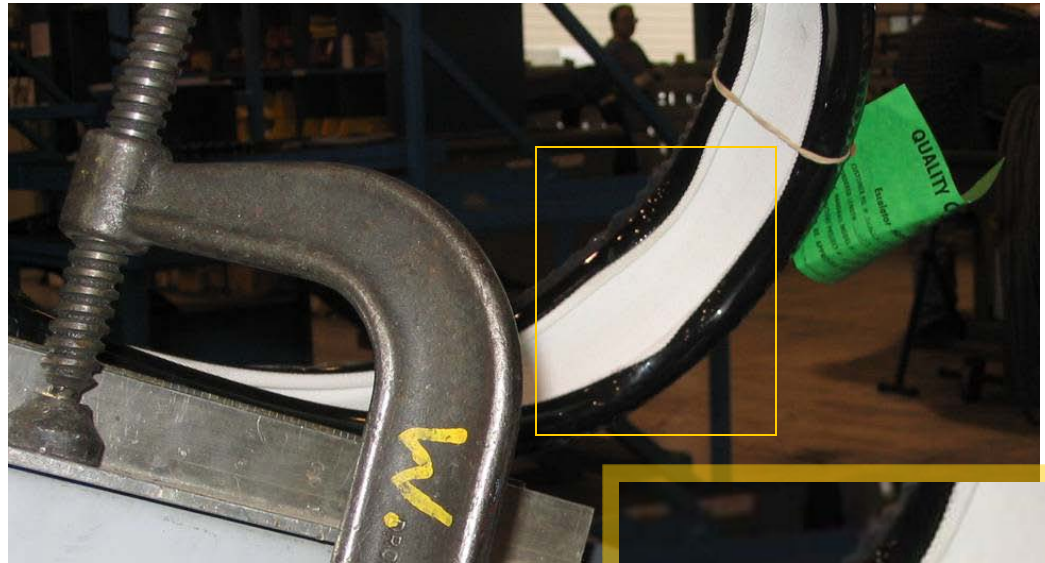
Handrail Drive Set Up

Linear Drive Escalators

- The NT handrail was designed to withstand the high drive roller pressures associated with Linear Drive units. This type of drive utilizes a series of smaller wheels, usually urethane coated, which drive in the belly of the handrail and a second set of rollers which push the handrail against the drive wheels by applying pressure to the face of the handrail
- This type of drive, if not set up or maintained correctly, can apply loads which will quickly destroy a conventional rubber handrail through delamination of the internal layers of fabric and rubber
- The NT handrail is an advanced thermoplastic elastomer which will not delaminate as it is essentially one single layer so it will withstand higher drive pressures to eliminate slippage. However, “**excessive closing pressure**” of the drive can have a negative effect on escalator drive components and may cause the handrail to run warm

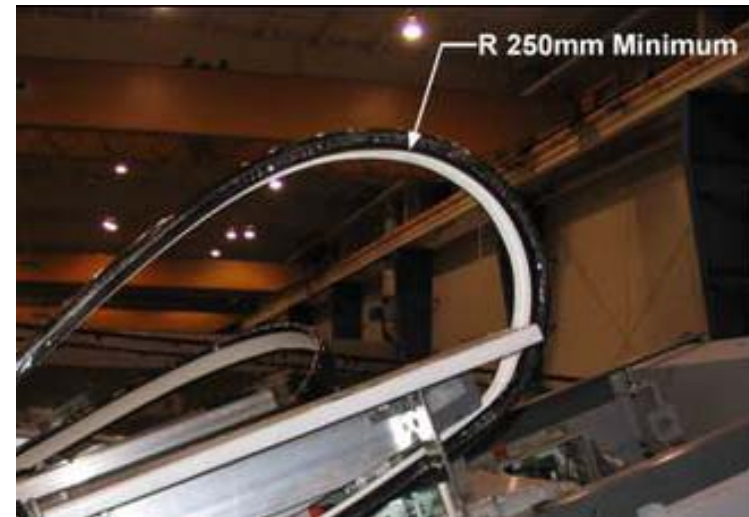
Factory Set Up

- Some care is required during the installation of NT handrails
 - These can become kinked if improperly handled



Factory Set Up

- Particular care should be taken at the loop ends
 - The radius at the loop end should not be allowed to become smaller than 250mm
- Care also needs to be taken when hanging the handrail along the side of the unit during fabrication
 - Standard hangers are good as long as no sharp bends occur



Storage

- You can store NT handrails as long as you store rubber handrails
 - however, NT will not bloom, unlike rubber handrails which require significant cleaning prior to installation after storing to remove the bloom on the handrail surface
- NT handrails need to be stored indoors in a dry location

Field Splicing NT

- NT field splices are equivalent to factory splices in every way (aesthetics and strength), providing longer lifespan than rubber handrails spliced in the field
- Rubber field splices do not last as long as factory splices

NT Applicability

Applicable Environments

Item	Rubber	NT
Place	Indoor or Outdoor	Indoor & Outdoor
Temperature Range	- 10 °C ~ 50 °C	- 10 °C ~ 50 °C
Humidity Range	0 % ~ 95 %	0 % - 95%
Water Contact	Contact OK	Contact OK
Ultraviolet	contact accelerates aging	May effect some colours
Oil and Grease Resistance	Fair (swelling can occur)	Excellent
Solvent Resistance	Good	Fair (short term contact only)

NT Is Applicable On The Following Units:

OEM	ESCALATOR MODEL	HANDRAIL STYLE
OTIS	506SL	75
	506SLR	75
	NCE LINEAR (INDOOR)	75
	NCE LINEAR (OUTDOOR)	75
	NCE Basic	75
	506	83
	UB	83
	"J"-AIRE	83
	"J"-ATOR	83
	510 ESCALAIRE	83
	510	83
	Type R, RB, RBC	83
	Type R, RB, RBC Escalare	83
OTIS LG	Old Style	81
	New Style	81
	Sigma	75
KONE / O&K / MONTGOMERY	TRANSVARIO	80
	CONV.GLASS	89
	ECO 3000	80
	CRYSTAL 2000	89
SCHINDLER	SWE	80
	Heavy Duty (Transit)	80
	9300 Escalator	80
	SDS; Series 9000	80
	Millar retrofit RB	80

Continued...

OEM	ESCALATOR MODEL	HANDRAIL STYLE
Westinghouse	Mod 100	80
	Mod 200	80
	Mod 220	80
	Mod 250	80
THYSSEN	Avante	80
	Non-Glass	75
	723,732,822,823,824,000	75
WESTMONT	Glass Walk	83
HITACHI	HF	83
	HC	81
	HCXN	80
	Outdoor units with rollers	80
MITSUBISHI	Travator	80
	K-Type	83
FUJITEC	GS / V Series	80
	N series	81
	Autowalk	81
	Original Design	83
SUMITOMO	Moving Walk (older unit)	75
	Moving Walk (newer unit)	80
TOSHIBA	TA-S / TA-D (glass)	80
	TA- P (solid)	80
	Original Design	83
HYUNDAI		80
DONG YANG	30 °	83
	35 °	80
CNIM	REVERSE BEND	75
	LINEAR DRIVE	75
	LINEAR DRIVE	83

Applicability – Specific Situations

- NT was developed to excel on linear drive units, and over the years as the popularity of the product increased, EHC has improved the handrail to suit additional units
- NT is available for most commercial applications
- The following slides outline some specific situations where NT may not be suitable

Ultraviolet Exposure

- The following NT colours can be affected by ultraviolet exposure:
 - Gray
 - Blue
 - Beige
- We suggest that these colours are avoided if the NT handrails will be in direct sunlight

Guide Wear

- NT's polyester slider can wear guides quicker than rubber handrails with cotton slider, but are significantly better than nylon slidered rubber handrails
 - This only affects units that are fully guided newel ends
- EHC has continuously improved the fabric slider to provide better operation on these units
- EHC is also investigating alternate guide materials

Gloss Finish

- An NT handrail is much glossier than rubber handrails
- Whenever possible, EHC recommends that both handrails on an escalator or moving walk be replaced at the same time
 - this will ensure your customer has the benefit of two identical escalator handrails – both in appearance and performance

Some Comments From Customers

- NT solved my slippage problems on Westinghouse Mod 100, and the product stays clean – my customer is impressed
- Rubber handrails slipped all the time and wore out fast. NT is running perfect
- I would not hesitate to recommend NT handrails to anyone with Hitachi CXN escalators – past experience on that type of unit had not been good, since NT was installed, they have not had one moment of trouble. Unlike the other handrails, they run cool, do not slip, and are lasting longer
- NT has a better compression capability than rubber and has shown to improve slippage problems and extend handrail life in several test locations. The NT handrail also has a higher abrasion resistance than the conventional handrail, giving it a better appearance over the life of the unit

The Next Generation of Escalator Handrails...

NT offers you many advantages over rubber handrails

- ✓ *Looks better*
- ✓ *Runs better*
- ✓ *Your customers will thank you*