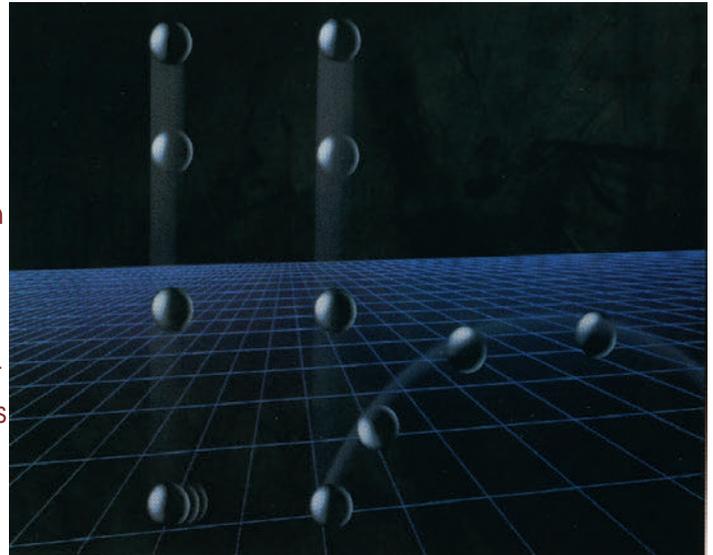


# HAPPY & UNHAPPY BALLS

N99-P70-3840

The HAPPY BALL is made of common neoprene. The UNHAPPY BALL is made of rubber called Norbornene polymer (brand name: Norsorex), which possesses excellent impact absorption properties. The rubber has great internal absorption of input energy and is able to dampen impact from a colliding object without giving the object a reaction force. It has the advantage whereby little resonance is caused by external vibrations. It can be processed in a manner similar to that of ordinary rubber, and sheets made of this material are utilized in many applications.



## CHARACTERISTICS

1. Low restitution elasticity (less than 10%)
2. Excellent energy absorption under normal temperature ranges (10 ~ 30°C)
3. Absorption and insulation of high frequency vibrations are exceptional

## RANGE OF USE

1. Damping Material
  - Protection of conveyor mechanism, stoppers for precise location of conveyed articles, and shock absorbers (in place of pneumatic and hydraulic devices)
2. Padding Materials
  - Protects dropped items from damage and reduces leg and loin fatigue
3. Material for Minimizing unwanted Audio Equipment Resonance
  - Prevents speaker howl and insulates player units from external vibrations
4. Low Hardness Rubber Roll Material
  - Rolls for printing
5. Footwear Sole Material
  - Reduces heelstrike fatigue
6. Industrial Applications
  - Gaskets and Packing
7. Sporting Goods
  - Gloves, Mitts, and Supporters



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### Manual of Operations

**IMPORTANT!**  
**Read the following before using this equipment:**

Carefully follow all instructions and observe all precautions given in this manual

Version2.1.SA100814

## COMPARISON OF MECHANICAL PROPERTIES

Item	Neoprene (Happy Ball)	Norsolex (Unhappy Ball)
Tensile Strength (kg f/cm <sup>2</sup> )	205	124
Stretch (%)	370	550
Hardness (JIS A)	63	32
Restitution Elasticity (%)	53	3
Compression Permanent Set (70°C x 22H%)	15	478
Specific Gravity	1.39	1.25

## MANUFACTURING METHOD OF NORSOLEX

As shown in Figure 1, Norsorex is obtained through the synthesis of Norbornene from Ethylene Cyclopentadiene by the Diels-Alder's reaction, then through ring opening polymerisation of the Norbornene monomer. Norsorex is a polymer which has a construction whereby double bonding and the five membered ring have been bonded alternately, which means that vulcanization can be done by utilizing this double bonding.

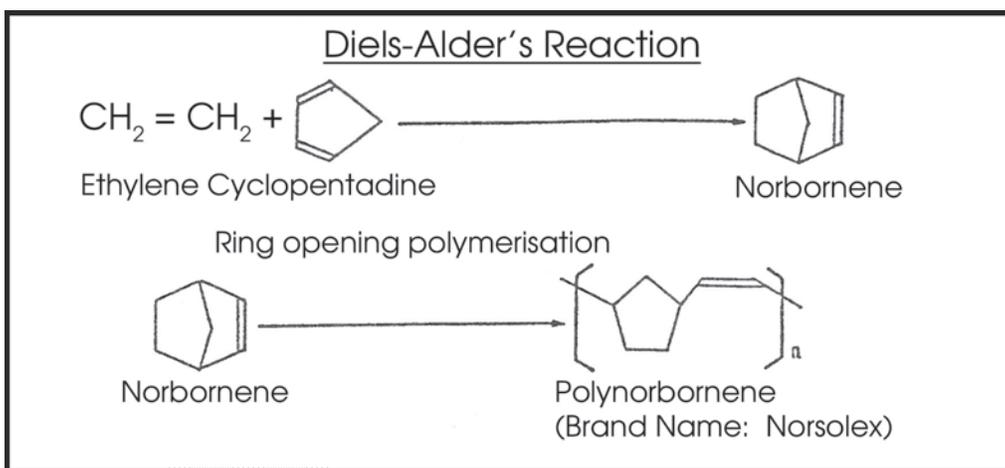


Figure 1

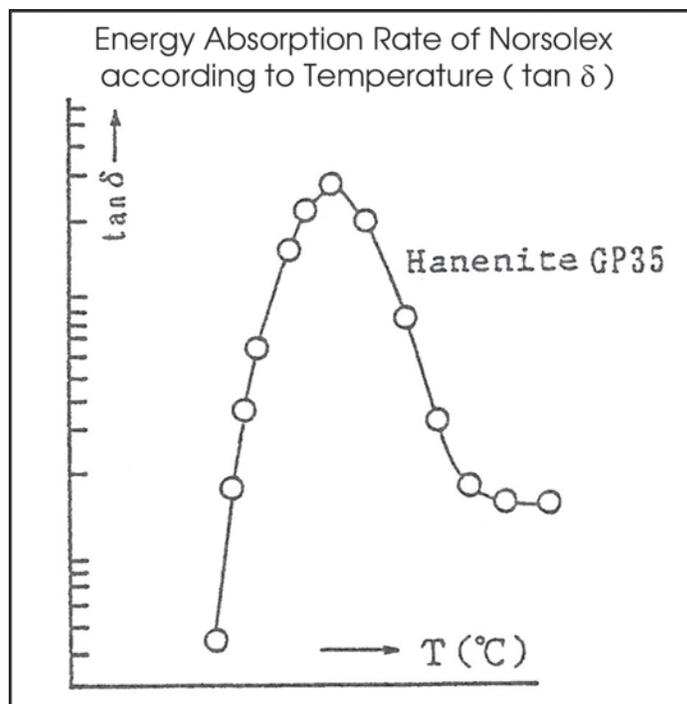


Figure 2