BEFORE THE ELEVATOR SAFETY BOARD
STATE OF ARKANSAS

IN RE: THYSSENKRUPP ELEVATOR

ORDER

This matter came before the Elevator Safety Board on Thursday, September 17, 2009. The petitioner was represented by Phil Hampton, Mark Stinger, Mark Dye and Matthew Wilson. The Department of Labor was represented by counsel, Daniel Faulkner, and by Larry Smothers, Chief Elevator Inspector. The Board makes the following findings of fact and conclusions of law.

FINDINGS OF FACT:

1. ThyssenKrupp Elevator previously requested two blanket variances to accommodate new technology with respect to the diameter of steel wire ropes and non-metallic sheaves at the Elevator Safety Board Meeting held September 18, 2008. The Board denied this request. See attached Exhibit A.

2. After the denial, the petitioner requested a re-hearing, and narrowed its variance requests to a limited variance only to convert three (3) existing "ISIS2" elevator cables within the state of Arkansas with the new technology presented in the original variance request with respect to the diameter of steel wire ropes and non-metallic sheaves.

STEEL WIRE ROPES

3. On June 1, 2008, the board adopted ASME A17.1-2007 for new construction. Standard 2.20.4 provides:

2.20.4 Minimum Number and Diameter of Suspension Ropes. The minimum number of hoisting ropes used shall be three for traction elevators and two for drum-type elevators.

Where a car counterweight is used, the number of counterweight ropes used shall be not less than two

The term "diameter" when used in reference to ropes, shall refer to the nominal diameter as given by the rope manufacturer.

The minimum diameter of hoisting and counterweight ropes shall be 9.5 mm (0.375 in.). Outer wires of ropes shall not be less than 0.56 mm (0.024 in.) in diameter.

4. ThyssenKrupp requests approval for the use of small diameter ropes based on language currently proposed to the ASME A17 Code Committee. Specifically:

2.020.4 Minimum Number and Dimensions of Suspension ~~Ropes~~ Means

2.20.4.1 Suspension Steel Wire Ropes. The minimum number of ~~hoisting ropes~~ suspension members used shall be three for traction elevators and two for drum type elevators.

Where a car counterweight is used, the number of counterweight ropes used shall be not less than two.

The term "diameter" where used in reference to ropes, shall refer to the nominal diameter as given by the rope manufacturer.

The minimum diameter of suspension and counterweight ropes shall be ~~8mm (0.312 in.)~~ 4.0 mm (0.156 in.). Outer wires of steel wire ropes shall be not less than ~~00.51 mm (0.020 in.)~~ 0.21 mm (0.008 in.) in diameter.

5. ThyssenKrupp submitted additional data on the 8 mm steel ropes in RH #1. A sample of the existing ISIS2 ropes was submitted as RH #2; and a sample of the proposed ropes was submitted as RH #3.

NONMETAL SHEAVES

6. ASME A17.1-2007, Standard 2.24.2 provides, in pertinent part:

2.24.2 Sheaves and Drums

2.24.2.1 Material and Grooving. Sheaves and drums used with suspension and compensating ropes shall be of metal and provided with finished grooves for ropes or shall be permitted to be lined with nonmetallic groove material.

7. ThyssenKrupp requests approval for the use of nonmetallic sheaves based on language currently proposed to the ASME A17 Code Committee. Specifically:

> 2.24.2 Sheaves and Drums
> 2.24.2.1 Material and Grooving. Sheaves and drums used with suspension and compensating members shall be constructed of materials conforming to 2.24.2.1 or 2.24.2.1.2 and provided with finished grooves or shall be permitted to be lined with nonmetallic groove material. Sheaves and drums shall comply with 2.24.3.
>
> 2.24.2.1.1 Sheaves. Driving machine sheaves shall be integral with or directly attached to driving machine shafts. Sheaves shall be provided with steel shafts and metal bearings. Sheaves constructed of plastic, fiber reinforced plastic or combinations thereof shall be non-regroovable. Permanent and legible marking shall be provided on or adjacent to the non-metallic sheaves stating "Regrooving of sheave is not permitted".

8. ThyssenKrupp stated:

> Several systems in operation worldwide including North America use non-metallic ideler, deflector, and compounding sheaves. Unlike line sheaves allowed by the Code, the entire sheave assembly is made of plastic with the bearing housed in the hub of the material. These non-metallic sheaves have been in common use in North America for many years. Because they will comply with all the factors of safety as high elongation material sheaves must comply with, our experience with their use in previously approved products and their proposed inclusion into A17.1, we are asking for their continued use.

ThyssenKrupp variance request of April 23, 2008.

9. ThyssenKrupp stated that it wishes to convert the ISIS2 conveyances due to mechanical problems encountered in other states.

CONCLUSIONS OF LAW:

1. Ark. Code Ann. § 20-24-106(d) provides that "[t]he board shall also have the power in any particular case to grant exceptions and variations which shall only be granted where it is clearly evident that they are necessary in order to prevent undue hardship or where the existing conditions prevent compliance with the literal

requirements of the rules and regulations. In no case shall any exception or variation be granted unless, in the opinion of the board, reasonable safety will be secured thereby."

2. In the present case, the Board concludes that replacement of these ropes will actually increase the level of safety in these three (3) conveyances. Further, the board concludes that reasonable safety will be secured by allowing ThyssenKrupp to convert the three (3) existing ISIS2 conveyances with 8 mm steel wire rope (RH #3) and nonmetal sheaves.

THEREFORE, the Board grants a limited variance to ThyssenKrupp to convert the three (3) existing ISIS2 conveyances within the State of Arkansas with 8 mm steel wire rope (RH #3) and nonmetal sheaves.

IT IS SO ORDERED.

ELEVATOR SAFETY BOARD
STATE OF ARKANSAS

By: _____
James L. Salkeld, Chairman

DATE: 10-6-2009

Approved as to Form:

Daniel Knox Faulkner (2002-168)
Staff Attorney
Arkansas Department of Labor
10421 West Markham
Little Rock, AR 72205
(501) 682-4504
daniel.faulkner@arkansas.gov

BEFORE THE ELEVATOR SAFETY BOARD
STATE OF ARKANSAS

IN RE: THYSSENKRUPP ELEVATOR

ORDER

This matter came before the Elevator Safety Board on Thursday, September 18, 2008. The petitioner was represented by Phil Hampton and Jason Cobb. The Department of Labor was represented by counsel, Denise Oxley, and by Larry Smothers, Chief Elevator Inspector. The Board makes the following findings of fact and conclusions of law.

FINDINGS OF FACT:

1. ThyssenKrupp Elevator requests two blanket variances to accommodate new technology with respect to the diameter of steel wire ropes and non-metallic sheaves.

STEEL WIRE ROPES

2. On June 1, 2008, the board adopted ASME A17.1-2007 for new construction. Standard 2.20.4 provides:

> 2.20.4 Minimum Number and Diameter of Suspension Ropes. The minimum number of hoisting ropes used shall be three for traction elevators and two for drum-type elevators.
>
> Where a car counterweight is used, the number of counterweight ropes used shall be not less than two
>
> The term "diameter" when used in reference to ropes, shall refer to the nominal diameter as given by the rope manufacturer.
>
> The minimum diameter of hoisting and counterweight ropes shall be 9.5 mm (0.375 in.). Outer wires of ropes shall not be less than 0.56 mm (0.024 in.) in diameter.

3. ThyssenKrupp requests approval for the use of small diameter ropes based on language currently proposed to the ASME A17 Code Committee. Specifically:

> 2.020.4 Minimum Number and Dimensions of Suspension ~~Ropes~~ Means

EXHIBIT A

2.20.4.1 Suspension Steel Wire Ropes. The minimum number of ~~hoisting ropes~~ suspension members used shall be three for traction elevators and two for drum type elevators.

Where a car counterweight is used, the number of counterweight ropes used shall be not less than two.

The term "diameter" where used in reference to ropes, shall refer to the nominal diameter as given by the rope manufacturer.

The minimum diameter of suspension and counterweight ropes shall be ~~8mm (0.312 in.)~~ 4.0 mm (0.156 in.). Outer wires of steel wire ropes shall be not less than ~~00.51 mm (0.020 in.)~~ 0.21 mm (0.008 in.) in diameter.

3. ThyssenKrupp stated that the 8mm steel wire rope has been used worldwide for more than 40 years.

4. ThyssenKrupp alleged that the proposed changes were not technically controversial with respect to the use of the smaller rope and such changes have not been approved by the ASME Committee for reasons unrelated to safety. There was no evidence or information from the ASME Committee.

5. ThyssenKrupp submitted some technical data on the 8 mm steel ropes, but no independent analysis of relative safety.

NONMETAL SHEAVES

6. ASME A17.1-2007, Standard 2.24.2 provides, in pertinent part:

2.24.2 Sheaves and Drums

2.24.2.1 Material and Grooving. Sheaves and drums used with suspension and compensating ropes shall be of metal and provided with finished grooves for ropes or shall be permitted to be lined with nonmetallic groove material.

7. ThyssenKrupp requests approval for the use of nonmetallic sheaves based on language currently proposed to the ASME A17 Code Committee. Specifically:

2.24.2 Sheaves and Drums

2.24.2.1 Material and Grooving. Sheaves and drums used with suspension and compensating members shall be constructed of materials conforming to 2.24.2.1 or 2.24.2.1.2 and provided with finished grooves or shall

be permitted to be lined with nonmetallic groove material. Sheaves and drums shall comply with 2.24.3.

2.24.2.1.1 Sheaves. Driving machine sheaves shall be integral with or directly attached to driving machine shafts. Sheaves shall be provided with steel shafts and metal bearings. Sheaves constructed of plastic, fiber reinforced plastic or combinations thereof shall be non-regroovable. Permanent and legible marking shall be provided on or adjacent to the non-metallic sheaves stating "Regrooving of sheave is not permitted".

8. ThyssenKrupp stated:

Several systems in operation worldwide including North America use non-metallic ideler, deflector, and compounding sheaves. Unlike line sheaves allowed by the Code, the entire sheave assembly is made of plastic with the bearing housed in the hub of the material. These non-metallic sheaves have been in common use in North America for many years. Because they will comply with all the factors of safety as high elongation material sheaves must comply with, our experience with their use in previously approved products and their proposed inclusion into A17.1, we are asking for their continued use.

ThyssenKrupp variance request of April 23, 2008.

CONCLUSIONS OF LAW:

1. Ark. Code Ann. § 20-24-106(d) provides that "[t]he board shall also have the power in any particular case to grant exceptions and variations which shall only be granted where it is clearly evident that they are necessary in order to prevent undue hardship or where the existing conditions prevent compliance with the literal requirements of the rules and regulations. In no case shall any exception or variation be granted unless, in the opinion of the board, reasonable safety will be secured thereby."

2. In the present case, the board can not conclude that reasonable safety will be secured.

3. The American Society of Mechanical Engineers (ASME) A17.1 Code Committee has had more than one opportunity to approve the 8 mm steel wire ropes and the non-metal

sheaves. They have failed to do so for whatever reason. The board recognizes and respects their expertise in this matter.

4. Further, while ThyssenKrupp presented technical data on both variances, this did not include third party independent evaluation of the relative safety of the proposals.

THEREFORE, the Board denies the requested variances of ThyssenKrupp.

IT IS SO ORDERED.

ELEVATOR SAFETY BOARD
STATE OF ARKANSAS

By: James L. Salkeld
James L. Salkeld, Chairman

DATE: 10-5-09

Approved as to Form:

Denise P. Oxley (84117)
Chief Legal Counsel
Arkansas Department of Labor
10421 West Markham
Little Rock, AR 72205
(501) 682-4504
denise.oxley@arkansas.gov