ABB CONTACT
Parts and Service News For the Power Transformer and Circuit Breaker Maintenance Community
October 2000 Special No. 5

ABB's Railcar Rental Program is the Ticket for Power Transformer Transport Projects

Get onboard. ABB's Railcar Rental program can help make your next large power transformer transport project run smoothly from start to finish -- and save you money in the process.

If you ever managed a large power transformer relocation project, you know it requires a specially designed railcar to handle the large dimensions and extreme weight. What you may not know is that the ABB Power Transformer Division owns and operates a fleet of these unique railcars.

As customer demand for these railcars continues to grow, ABB is answering the need with a comprehensive program designed to help them meet the complex logistics associated with moving transformers by rail.

Railcar Rental Arrangements and Terms

ABB's rail specialists are available to assist customers in all areas of railcar selection, scheduling, insurance and contracting.

Rental terms typically include, but are not limited to, the following:

- Daily rental rates are applicable from the day the car departs an ABB facility until the day it returns.
- All freight charges are the customer's responsibility.
- Any damage to the railcar, whether caused by customer or railroad, is the responsibility of the customer.
- A rental contract must be executed prior to the release of any railcar to the customer.
- ABB technical assistance is required on-site during the loading and unloading of schnable cars.

Specialized Railcar Types and Uses

Depressed Center - 12 axle depressed center flatcars are used with larger load requirements. These cars are equipped with a cushioning system to provide a smooth ride along the rails.

Schnabel - Certain transformers are designed to be an integral part of the "schnable type" car. The transformer attaches to railcar frames utilizing a pinning system located near the base. This allows the transformer to ride approximately 6" above the rail. These cars range in mechanical design from 12 to 20 axles.

Contact talks with Mr. Craig Steffey (ABB Traffic Administrator) about railcar rental.

Q. Why rent a railcar?
A. Companies with occasional uses for railcars cannot justify the high cost of ownership. A 12 axle depressed center car can cost $750,000, and a 20 axle schnabel car can run as much as $2.2 million to build. One company may need several types of railcars to carry the different transformers they own. And building these railcars can take as long as two years.

Q. What types of transformers will ABB's railcars carry?
A. Our depressed center cars will carry any make if dimensions and weight allow. The schnabel cars are designed for certain Westinghouse, ABB and GE units. We have special adapters for our schnabel cars that allow each car to carry different makes and types. Our side rail is for use with GE side rail transformers only.

Q. What are the typical lead times needed to rent a railcar?
A. ABB's railcars typically range from immediate availability, to three, to as much as six months lead time. Right now we have four cars in use and three are available from our depot in New Castle, PA. Our schedule for these cars changes on a day to day basis. I encourage customers to contact us at least three months in advance of a project to rent a car. Even if we have the car a customer needs, there are other time intensive issues such as contracts, insurance, special permits and other requirements that must be addressed prior to delivering a railcar to the project site.

Railcar Types and Capacities

The ABB Railcar Rental Program includes the type and class of railcars listed below.

Car #	Type	Load (lbs.)
PTDX7060	Dep. Center	512,000
PTDX7061	Dep. Center	620,000
PTDX-201	Schnabel	750,000
PTDX-202*	Schnabel	1,000,000
PTDX-203	Schnabel	750,000
PTDX-204	Schnabel	750,000
PTDX-205	Side Rail	733,000

** A special train is required to move this car under load.Special train rates are charged on a per-mile basis, plus normal freight charges.*

Contact the ABB Power Transformer Division toll free at 877-839-7877 for additonal technical information, scheduling and quotations.

ABB Power T&D Services Establishes National Presence and Adds to Capabilities

It has been a little over one year since ABB Power T&D Company announced plans to formally establish it's T&D Services business. Much has been accomplished during the first year operations of ABB Power T&D Services.

Regional Service Centers

ABB established a program to open Regional Service Centers across the United States. A network of people and facilities have been created and located in ten cities. ABB now has a local service presence in the following locations:

- Baton Rouge, LA
- Charlotte, NC
- Chicago, IL
- Cleveland, OH
- Houston, TX
- Minneapolis, MN
- Philadelphia, PA
- Phoenix, AZ
- St. Louis, MO
- Stockton, CA

The regional service center network is currently staffed with approximately 70 people, and is still growing. Norm White (ABB's US Manager, Service Sales) said, "We now have a critical mass of personnel in each of our locations to deliver basic operation, maintenance, construction, and testing services to our customers." With the Regional Service Center network, ABB has positioned themselves to become a business partner meeting the power transmission and distribution needs (both equipment and services) of their customers. Many of the regional service centers have integrated themselves as a regular support partner for their local client base. "Our industrial clients are focussing more on their core business processes, and looking for an outside source to support their power distribution infrastructure. Our utility customers each have a large number of projects that are required to meet the demands of general system maintenance, increased system load….combined with tying-in new merchant power plants. Our utility customers do not have the resources, in-house, to handle this huge volume of work, and they are turning to someone like ABB who has the expertise to support their total T&D system needs."

ABB plans to continue expansion, and will open additional Regional Service Centers throughout the latter half of year 2000 and year 2001.

Turnkey Projects

ABB Power T&D Services has also been active in expanding and improving power transmission and distribution systems on a turnkey basis. ABB has the combined resources to perform system analysis, optimized system design, detailed system engineering, project management, construction management, along with installation and commissioning services. These capabilities, combined with ABB manufactured equipment, allow Power T&D Services to take total project ownership and many times provide a solution on an aggressive time schedule. Several such turnkey projects have been initiated and completed since ABB created its Power T&D Services group in March 1999 and other projects are in process.

Call Center

ABB Power T&D Services established a national Call Center [tel. 1-877-511-4222 (4ABB)] in November 1999, implemented in time to provide support during the Y2K rollover period. The Call Center has continued in operation to provide a 24 hour-a-day, seven day-a-week response capability to ABB customers. The Call Center operates under a "One Call Resolution" principle. The "Call Center" will either immediately respond to a customer's inquiry, or will acquire all necessary information and work within the ABB organization to identify the appropriate party to respond to the customer's need. Hence the ABB customer need only make "One Call" to ABB, for service or support. Activity (call volume) in the Call Center has grown steadily since its inception. The Call Center is also linked to the ABB website, and can also receive inquiries via email at: abbcallcenter@cplc.com

This is a summary of the ABB Power T&D Services business and capabilities. Look for more information about ABB Power T&D Services in future issues of *Contact*.

ABB Power T&D Services has the equipment, technical and human resources available on a 24-hour basis to meet customer service needs either on-site or at one of its 10 Regional Service Centers located in the US.

IEEE/PES Creates "Streamlined" Standards for Outdoor Apparatus Bushings

During the work on the latest revision, IEEE Std *C57.19.01-2000,* major changes have been incorporated. These changes were the result of feedback from the Edison Electric Institute (EEL), original equipment manufacturers (OEMs), and users. The ratings were standardized in an effort to create fewer ratings and reduce the need for large inventories of spare bushings, which have accumulated from decades of special designs. Bushings in inventory incur a large tax burden from accruing bushing costs in 2 to 5 years. In addition, the requirement for bushings for application on new bulk oil circuit breakers ceased because these breakers were no longer being produced. The working group reviewed this information and agreed to revise the standard to reduce the number of ratings, promote standardization, improve bushing characteristics for new transformers, and achieve overall cost improvements. This work has resulted in the reduction of designs/ratings from 56 to 21. These changes include the following:

Table 1, Electrical insulation characteristics. The number of voltage classes has been reduced from 19 to 7 to cover the 34.5—765 kV voltage range. Voltage/insulation classes, which were a part of Table I in IEEE Std C57.19.0l-1991, but not included in Table 1 of this standard, are included in Annex A to provide information on replacement bushings. The system voltage designation has been changed to indicate nominal rating in conformance with transformer standard IEEE Std C57.12.00-1993. The BIL rating for each voltage class is based on the highest BIL specified in IEEE Std C57.12.00-1993 for the same voltage class. A BIL of 2050 kV has been adopted for 756 kV rating. A column on creepage distance has been added to provide information on values corresponding to contaminated (heavy) environments as per IEEE Std C57.19.l00-1995.

Table 2, Dimensions for bushings up to 69 kV Current ratings of 400/1200 A, 2000 A, 3000 A, and 5000 A have been standardized. A current transformer pocket length of *534* mm (21 in) has been standardized for these ratings. The bottom-end length has been standardized in each voltage class. The top terminal diameters have been standardized at 1.5 in for current up to 2000 A, 2 in for 3000 A, and 4 in for 5000 A rating. The bottom terminal configuration for ratings 2000 A and above have been changed from threaded stud to two- and four-hole bladed configurations similar to those in NEMA CC 1-1993. Information on transformer and circuit breaker interchangeable (TBI) and breaker ratings has been taken out. The footnote on draw-lead application has been revised to define the current-carrying limit.

Table 3, Dimensions for bushings above 69 *kV.* Current ratings of 800/1200 A, 2000 A, and 3000 A have been standardized. A current transformer pocket length of 584 mm (23 in) has been standardized for these ratings. The bottom-end length has been standardized in each voltage class. The "D" diameter for the 196/230 kV rating has been reduced. The top terminal diameters have been standardized at *1.5* in for current up to 2000 A, and 2 in for 3000 A rating. Dimensions for 500 kV and *765* kV ratings have been added. Information on TBI and breaker ratings has been taken out. The footnote on draw-lead application has been revised to define the current-carrying limit.

Table 4, Cantilever test requirements. The table has been simplified and expanded to include information on bushings above 345 kV. The permanent deflection at the bottom end has been revised to reflect transformer bushings requirement. Information on TBI and breaker ratings has been taken out.

Table 5, Partial discharge limits. The requirement at maximum L-G voltage has been taken out.

Table 6, Power factor and capacitance limits. The limit for power factor for oil-impregnated, paper-insulated bushings has been lowered from *0.55%* to *0.50%.* Also, the power factor change limits for these bushings have been changed from +0.021—0.06 to +0.021—0.04.

In addition, metric units have been adopted as primary units followed by inch-pound-based units in parentheses. Units/dimensions that are dependent upon inch-sized dies/tools have not been converted to metric units. Threads/inch and flange bolt hole diameters fall into this category.

Annex A, Electrical insulation characteristics. This annex has been added to include the insulation characteristics for ratings, which were a part of IEEE Std C57.19.Ol-1991, but not included in Table 1 of this standard. This information has been provided for replacement purposes only.

Pritpal Singh, fellow engineer with the ABB Power T&D Company Compnents Division in Alamo, TN, served as chairman of the IEEE Working Group PC57.1901 and secretary of the bushing sub committee. This group recently revised and updated many of the dimensional and other standards for the manufacture and operation of outdoor apparatus bushings.

IEEE Dimension Standards for Bushings Up To and Above 69 kV

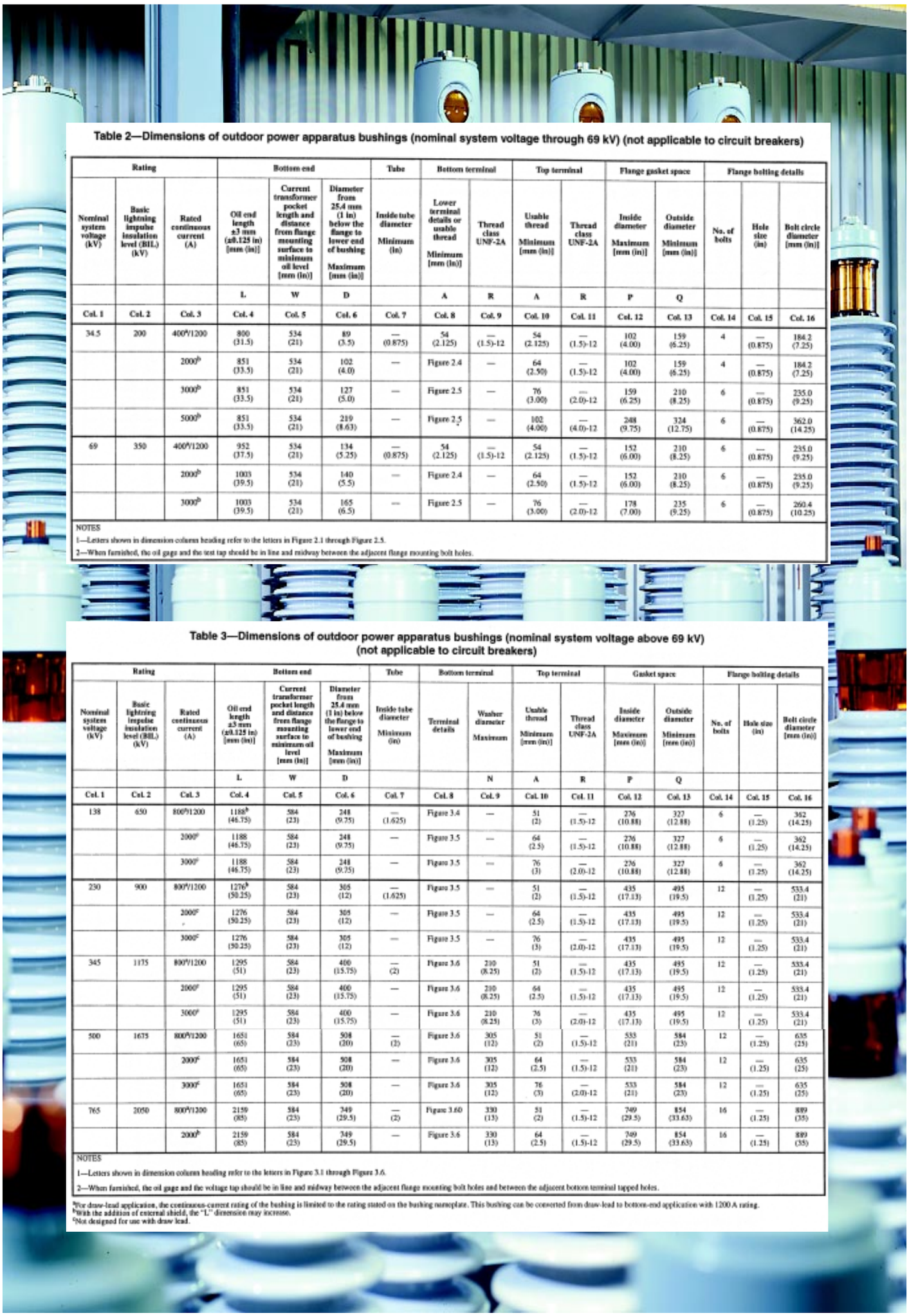

Table 2—Dimensions of outdoor power apparatus bushings (nominal system voltage through 69 kV) (not applicable to circuit breakers)

Rating			Bottom end			Tube	Bottom terminal		Top terminal		Flange gasket space		Flange bolting details		
Nominal system voltage (kV)	Basic lightning impulse insulation level (BIL) (kV)	Rated continuous current (A)	Oil end length ±3 mm (±0.125 in) [mm (in)]	Current transformer pocket length and distance from flange mounting surface to minimum oil level [mm (in)]	Diameter from 25.4 mm (1 in) below the flange to lower end of bushing Maximum [mm (in)]	Inside tube diameter Minimum (in)	Lower terminal details or usable thread Minimum [mm (in)]	Thread class UNF-2A	Usable thread Minimum [mm (in)]	Thread class UNF-2A	Inside diameter Maximum [mm (in)]	Outside diameter Minimum [mm (in)]	No. of bolts	Hole size (in)	Bolt circle diameter [mm (in)]
			L	W	D		A	R	A	R	P	Q			
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14	Col. 15	Col. 16
34.5	200	400[a]/1200	800 (31.5)	534 (21)	89 (3.5)	— (0.875)	54 (2.125)	— (1.5)-12	54 (2.125)	— (1.5)-12	102 (4.00)	159 (6.25)	4	— (0.875)	184.2 (7.25)
		2000[b]	851 (33.5)	534 (21)	102 (4.0)	—	Figure 2.4	—	64 (2.50)	— (1.5)-12	102 (4.00)	159 (6.25)	4	— (0.875)	184.2 (7.25)
		3000[b]	851 (33.5)	534 (21)	127 (5.0)	—	Figure 2.5	—	76 (3.00)	— (2.0)-12	159 (6.25)	210 (8.25)	6	— (0.875)	235.0 (9.25)
		5000[b]	851 (33.5)	534 (21)	219 (8.63)	—	Figure 2.5	—	102 (4.00)	— (4.0)-12	248 (9.75)	324 (12.75)	6	— (0.875)	362.0 (14.25)
69	350	400[a]/1200	952 (37.5)	534 (21)	134 (5.25)	— (0.875)	54 (2.125)	— (1.5)-12	54 (2.125)	— (1.5)-12	152 (6.00)	210 (8.25)	6	— (0.875)	235.0 (9.25)
		2000[b]	1003 (39.5)	534 (21)	140 (5.5)	—	Figure 2.4	—	64 (2.50)	— (1.5)-12	152 (6.00)	210 (8.25)	6	— (0.875)	235.0 (9.25)
		3000[b]	1003 (39.5)	534 (21)	165 (6.5)	—	Figure 2.5	—	76 (3.00)	— (2.0)-12	178 (7.00)	235 (9.25)	6	— (0.875)	260.4 (10.25)

NOTES

1—Letters shown in dimension column heading refer to the letters in Figure 2.1 through Figure 2.5.

2—When furnished, the oil gage and the test tap should be in line and midway between the adjacent flange mounting bolt holes.

Table 3—Dimensions of outdoor power apparatus bushings (nominal system voltage above 69 kV) (not applicable to circuit breakers)

Rating			Bottom end			Tube	Bottom terminal		Top terminal		Gasket space		Flange bolting details		
Nominal system voltage (kV)	Basic lightning impulse insulation level (BIL) (kV)	Rated continuous current (A)	Oil end length ±3 mm (±0.125 in) [mm (in)]	Current transformer pocket length and distance from flange mounting surface to minimum oil level [mm (in)]	Diameter from 25.4 mm (1 in) below the flange to lower end of bushing Maximum [mm (in)]	Inside tube diameter Minimum (in)	Terminal details	Washer diameter Maximum	Usable thread Minimum [mm (in)]	Thread class UNF-2A	Inside diameter Maximum [mm (in)]	Outside diameter Minimum [mm (in)]	No. of bolts	Hole size (in)	Bolt circle diameter [mm (in)]
			L	W	D			N	A	R	P	Q			
Col. 1	Col. 2	Col. 3	Col. 4	Col. 5	Col. 6	Col. 7	Col. 8	Col. 9	Col. 10	Col. 11	Col. 12	Col. 13	Col. 14	Col. 15	Col. 16
138	650	800/1200	1188[b] (46.75)	584 (23)	248 (9.75)	— (1.625)	Figure 3.4	—	51 (2)	— (1.5)-12	276 (10.88)	327 (12.88)	6	— (1.25)	362 (14.25)
		2000[c]	1188 (46.75)	584 (23)	248 (9.75)	—	Figure 3.5	—	64 (2.5)	— (1.5)-12	276 (10.88)	327 (12.88)	6	— (1.25)	362 (14.25)
		3000[c]	1188 (46.75)	584 (23)	248 (9.75)	—	Figure 3.5	—	76 (3)	— (2.0)-12	276 (10.88)	327 (12.88)	6	— (1.25)	362 (14.25)
230	900	800/1200	1276[b] (50.25)	584 (23)	305 (12)	— (1.625)	Figure 3.5	—	51 (2)	— (1.5)-12	435 (17.13)	495 (19.5)	12	— (1.25)	533.4 (21)
		2000[c]	1276 (50.25)	584 (23)	305 (12)	—	Figure 3.5	—	64 (2.5)	— (1.5)-12	435 (17.13)	495 (19.5)	12	— (1.25)	533.4 (21)
		3000[c]	1276 (50.25)	584 (23)	305 (12)	—	Figure 3.5	—	76 (3)	— (2.0)-12	435 (17.13)	495 (19.5)	12	— (1.25)	533.4 (21)
345	1175	800/1200	1295 (51)	584 (23)	400 (15.75)	— (2)	Figure 3.6	210 (8.25)	51 (2)	— (1.5)-12	435 (17.13)	495 (19.5)	12	— (1.25)	533.4 (21)
		2000[c]	1295 (51)	584 (23)	400 (15.75)	—	Figure 3.6	210 (8.25)	64 (2.5)	— (1.5)-12	435 (17.13)	495 (19.5)	12	— (1.25)	533.4 (21)
		3000[c]	1295 (51)	584 (23)	400 (15.75)	—	Figure 3.6	210 (8.25)	76 (3)	— (2.0)-12	435 (17.13)	495 (19.5)	12	— (1.25)	533.4 (21)
500	1675	800/1200	1651 (65)	584 (23)	508 (20)	— (2)	Figure 3.6	305 (12)	51 (2)	— (1.5)-12	533 (21)	584 (23)	12	— (1.25)	635 (25)
		2000[c]	1651 (65)	584 (23)	508 (20)	—	Figure 3.6	305 (12)	64 (2.5)	— (1.5)-12	533 (21)	584 (23)	12	— (1.25)	635 (25)
		3000[c]	1651 (65)	584 (23)	508 (20)	—	Figure 3.6	305 (12)	76 (3)	— (2.0)-12	533 (21)	584 (23)	12	— (1.25)	635 (25)
765	2050	800/1200	2159 (85)	584 (23)	749 (29.5)	— (2)	Figure 3.60	330 (13)	51 (2)	— (1.5)-12	749 (29.5)	854 (33.63)	16	— (1.25)	889 (35)
		2000[b]	2159 (85)	584 (23)	749 (29.5)	—	Figure 3.6	330 (13)	64 (2.5)	— (1.5)-12	749 (29.5)	854 (33.63)	16	— (1.25)	889 (35)

NOTES

1—Letters shown in dimension column heading refer to the letters in Figure 3.1 through Figure 3.6.

2—When furnished, the oil gage and the voltage tap should be in line and midway between the adjacent flange mounting bolt holes and between the adjacent bottom terminal tapped holes.

[a] For draw-lead application, the continuous-current rating of the bushing is limited to the rating stated on the bushing nameplate. This bushing can be converted from draw-lead to bottom-end application with 1200 A rating.
[b] With the addition of external shield, the "L" dimension may increase.
[c] Not designed for use with draw lead.

ABB's Advanced Technology "AT" Bushings Incorporate the Latest Design Advantages

Later this year, the ABB Components Division in Alamo, Tennessee will introduce a new line of Advanced Technology (AT) Bushings. These new bushings will offer the rating and dimensional advantages created by the latest IEEE specifications for outdoor apparatus bushings. To celebrate our new generation of AT Bushings, and to keep you up to date on the latest ABB products and services, we invite you to visit our web site to register to win our grand prize. All you need to do is provide an e-mail address to enter. Everyone is eligible to win*. Entries can also be mailed to: ABB Components Division, Route 1 Highway 412, Alamo, TN 38001.

VISIT www.abb-alamo.com TO REGISTER

Register to Win One of These Great Prizes!!!!!

A personalized ABB lambskin jacket with brass zipper and poly lining, or...

...An authentic Taylor Made driver with your choice of custom shaft.

** One entry per person. Entries must be received by 10/31/00. Winner will be notified by mail. ABB employees and relatives not eligible.*

Customer Demand for OEM Bushing, Transformer and LTC Training Seminars Continues to Grow at ABB Alamo Plant

Does your company provide training on this important equipment? Is your company downsizing? Are you loosing expertise in maintenance? Do you have more than one type of this equipment on your system? Are you maintaining it properly?

Here, at ABB's Transformer Components Manufacturing Facility in Alamo Tennessee, we are considered the experts on bushing, transformer, and LTC maintenance. Why? We have experienced design and field engineers that support Westinghouse, GE, Reinhausen , Moloney, ASEA, ABB and others equipment.

Attend our seminar and hear presentations from these expert engineers :

- **Dave Geibel** is a Senior Design Engineer in Tap Changer Design and Development. Dave has 26 years of extensive experience with ABB, GE, Reinhausen and Westinghouse Load Tap Changers (LTCs).

An ABB Technician assembling a Load Tap Changer in the Alamo facility.

ABB's technical training programs provides dedicated classroom and laboratory facilities for a "hands-on" learning experience.

- **Mike Brake** has 24 years of specialized knowledge in Power Transformer manufacturing, testing, installation, maintenance and troubleshooting. He also specializes in various types of load tap changers, power substations, and associated equipment
- **Prit Singh** has 25 years combined experience with ABB, GE, and Westinghouse Transformer and bushing design. Prit is Chairman of the IEEE Bushing Standards Committee.
- **Brian Twibell** is Manager of Field Projects for ABB St. Louis Technical Support. He has 11 years of expeience in manufacturing, testing and field engineering services solely related to power transformers.
- **Greg Clanin** has 36 years of experience in testing large power and instrument transformers, air core reactors, condenser and bulk bushings and various fundamental breakdown studies for all kinds of oil, pressboard, conductor shapes and SF_6 gas.
- **Daniel J. Herlihy** is a Bushing Product Engineer with 26 years of experience designing, testing and conducting quality programs for ABB and GE.

Topics to be covered:

- **For Bushings:**
  - Theory
  - Maintenance
  - Field Testing
- **For Transformers:**
  - Theory
  - Maintenance
  - Field Testing
  - Transporting and Installation
- **For Load Tap Changers (LTCs)**
  - Theory
  - Maintenance
  - Quality Pointers
  - Field Testing

Don't miss this one!!!!!!!!

November 6-10, 2000
(Morning session only on final day)
$595.00 net each.

For registration and details contact Randy Williams at 1-800-955-8399.

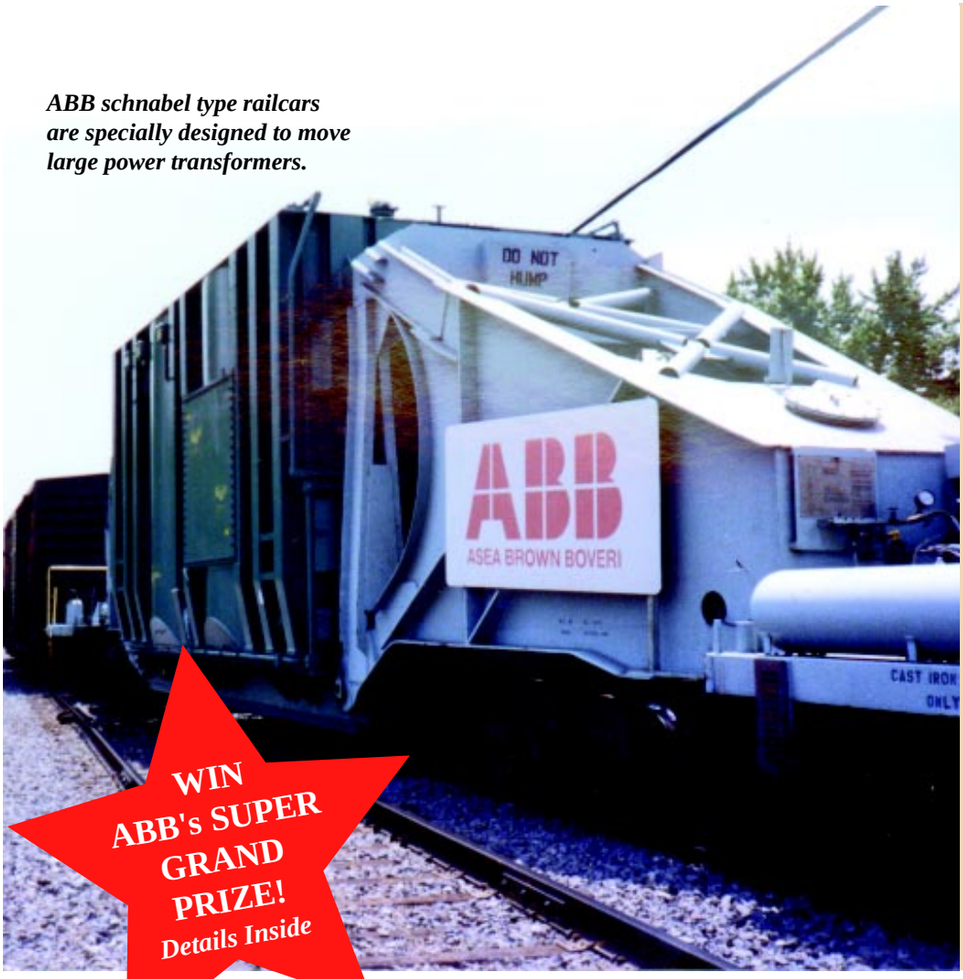

ABB schnabel type railcars are specially designed to move large power transformers.

WIN ABB's SUPER GRAND PRIZE! *Details Inside*

ABB Railcar Rental Program Helps Keep Transformer Projects on Schedule

Also in this issue...

- ABB Power T&D Services expands service capability
- New IEEE standards for bushings help simplify dimension and rating specifications
- Customer demand for factory sponsored technical training programs are on the increase
- ABB Advanced Technology (AT) bushings coming soon

ABB CONTACT

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