

1 SCOPE

This document lists the categories of equipment shown below, which are approved for connection to the SP Distribution Ltd, SP Manweb plc and SP Transmission Ltd networks.

It covers equipment types with rated voltages from LV up to 420kV. Equipment may be ground mounted or pole mounted as detailed in the appropriate table.

Approved Manufacturers.
Transformers.
Bushings.
Tap Changers.

2 ISSUE RECORD

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Date	Issue No	Author	Amendment Details
February 2001	1	Tom Breckenridge	Initial Issue: 18 Pages
November 2001	2	Tom Breckenridge	Issue 2: SP Power Systems name change
September 2005	3	Tom Breckenridge	Issue 3: Manufacturer and type updates
May 2009	4	Colin Brown	Issue 4: General Update

3 ISSUE AUTHORITY

Author	Owner	Issue Authority
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4 REVIEW

This document shall be reviewed periodically to update changes in approved status of manufacturing plants, and/or equipment types as necessary. In the event of no enforced changes, the document shall be reviewed every three years.

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6 REFERENCES

6.1 SP Power Systems Technical Specifications

T20

33 kV System Transformers.

T21

Distribution Transformers (25 kVA to 1000 kVA).

6.2 Electricity Networks Association Technical Specifications

ENATS 35-1

Distribution Transformers (from 16 kVA to 1000 kVA).

ENATS 35-2

Emergency Rated System Transformers 33 / 11.5 kV delta / star and star / star connected.

6.3 National Grid Transco Technical Specifications

NGTS 2.3 (Issue 1)

Transformers and Reactors.

NGTS 3.2.7

Bushings for the National Grid System.

NGTS 3.7.9

Automatic Tap Changer Control.

6.4 International Electrical Commission Specifications

IEC 60076 (All Parts)

Power Transformers.

IEC 60137

Insulating Bushings for Alternating Voltages above 1000V.

IEC 60214

On-Load Tap Changers.

7 STANDARD REQUIREMENTS

Transformers are approved on a contract specific basis due to technical and commercial considerations of the transformer design process. SP Power Systems have a number of **approved** suppliers for different classes of transformers, with the manufacturers plant carrying the **approved** status. Transformers manufactured by an **approved** supplier in a facility that has not been approved by SP Power Systems are not approved.

7.1 Power Transformers

7.1.1 Distribution Transformers (11 / 6.6 kV)

Are required to meet ENATS 35-1 and IEC 60076 as modified by SP Power Systems Technical Specification T21.

7.1.2 Primary Transformers (33 kV)

Are required to meet ENATS 35-2 and IEC 60076 as modified by SP Power Systems Technical Specification T20.

Note: 33/11kV units located in Manweb are not compliant with ENATS 35-2. These units are specified in SP Power Systems Ltd Technical Specification T20.

7.1.3 Transmission Transformers (>132 kV)

Are required to meet NGTS 2.3 and IEC 60076 as modified by contract specific SP Power Systems Technical Specification.

7.1.4 Earthing/ Auxiliary Transformers (33/0.415kV)

Are required to meet IEC 60076, IEC 60289 and BEBS T2 as modified by SP Power Systems Technical Specification.

7.1.5 Special Transformers (>132 kV)

Are required to meet NGTS 2.3 and IEC 60076 as modified by contract specific SP Power Systems Technical Specification.

7.2 Bushings

Are required to meet NGTS 3.2.7 and IEC 60137.

7.3 Tap Changers

Are required to meet IEC 60214.

8 APPENDICES

8.1 Approved Manufacturers

The following manufacturers are **approved** for the supply of transformers for connection to the ScottishPower system.

Non-approved manufacturers may be included in tender lists, but approval of the manufacturing facility must be obtained prior to contract award.

Only the **approved** manufacturers location specified in this document has **approved** status, suppliers with other manufacturing sites must have a different location approved prior to using the site to manufacturer units to supply SP Power Systems Ltd.

All transformers supplied from an **approved** manufacturer and location will be subject to separate plant type approval by SP Power Systems Ltd.

8.1.1 Distribution Transformers (11kV/433V, 11 - 6.6 kV / 433 V)

Manufacturer	Address	Status
Alstom	41410 Gebze-Kocaeli, Turkey	Current Supplier
EFACEC Energia	PO Box 1018, 4466-952 S. Mamede de Infesta, Portugal	Current Supplier
Schneider Electric	Merlin Gerin Transformers, 123 Jack Lane Leeds, LS10 1BS	Only units wholly manufactured in Leeds are approved.
Pauwells Trafo	Dublin Road, Cavan, Ireland	Current Supplier
SGB Starkstrom Geratebau	Ohmstrasse 1, Neumark, Sachsen, Germany	
VA Tech Elin Transformatoren	Elingasse 3 A-8160 Wiess, Austria	
Wilson Transformer PTY Ltd	10 Maloney Drive, Wodonga, Victoria 3690. Australia	
Winder Electrical	Belgrave Works. Stanningley, Leeds LS28 6HB	
ABB	Tycor, Waterford, Ireland	Audit carried out in March 2006

8.1.2 Primary Transformers (33 / 11.5 kV, 33/11kV, 33/6.6kV, 33/11-6.6kV)

Manufacturer	Address	Status
Alstom	41410 Gebze-Kocaeli, Turkey	
Brush Transformers	Loughborough, Leicestershire LE11 1EZ	Current Supplier (Manweb Requirements)
SGB Starkstrom Geratebau	Ohmstrasse 11, Regensburg, Germany	
Smit Transformatoren BV	PO Box 9107, 6500 HJ Nijmegen, The Netherlands	Current Supplier (Scotland)
VA Tech EBG Transformers	Kaiser Strasse 7, Linz, Austria	
Wilson Transformer PTY Ltd	Wilson Road, Glen Waverley, Victoria 3150. Australia	

8.1.3 Transmission Transformers (132 /33kV, 132/11kV)

Manufacturer	Address	Status
ABB Power T&D Limited	1. Lohfelder Strasse, Bad Honnef, Germany 2. Stromberg Park, Vaasa, Finland 3. 67/93 Aleksandrowska Street, Lodz, Poland	1. Recent Supplier 2. Up to 60 MVA only 3. Recent Supplier
Alstom	41410 Gebze-Kocaeli, Turkey	
Brush Transformers	Loughborough, Leicestershire LE11 1EZ	Up to 45MVA only
SGB Starkstrom Geratebau	Ohmstrasse 11, Regensburg, Germany	
Siemens	Katzwanger Strasse 150, 90461-Nuernberg, Germany	
Smit Transformatoren BV	PO Box 9107, 6500 HJ Nijmegen, The Netherlands	
Wilson Transformer PTY Ltd	Wilson Road, Glen Waverley, Victoria 3150. Australia	Recent Supplier
VA Tech EBG Transformers	Kaiser Strasse 7, Linz, Austria	Recent Supplier

8.1.4 Transmission Transformers (275 kV)

Manufacturer	Address	Status
ABB T&D Limited	1. Lohfelder Strasse, Bad Honnef, Germany 2. SE-771 80 Ludvika, Sweden	1. Recent Supplier
Alstom	1. PO Box 26, Lichfield Road Stafford 2. 41410 Gebze-Kocaeli, Turkey	
Siemens	Katzwanger Strasse 150, 90461-Nuernberg, Germany	
Smit Transformatoren BV	PO Box 9107, 6500 HJ Nijmegen, The Netherlands	Recent Supplier
VA Tech EBG Transformers	Kaiser Strasse 7, Linz, Austria	
Wilson Transformer PTY Ltd	Wilson Road, Glen Waverley, Victoria 3150. Australia	Up to 240 MVA only

8.1.5 Transmission Transformers (400 kV)

Manufacturer	Address	Status
ABB Power T&D Limited	1. Lohfelder Strasse, Bad Honnef, Germany 2. SE-771 80 Ludvika, Sweden	1. Recent Supplier
Alstom	PO Box 26, Lichfield Road Stafford	Recent Supplier
Siemens	Katzwanger Strasse 150, 90461-Nuernberg, Germany	
Smit Transformatoren BV	PO Box 9107, 6500 HJ Nijmegen, The Netherlands	Recent Supplier

8.1.6 Earthing/ Auxiliary Transformers (33/0.415kV)

Manufacturer	Address	Status
SGB Starkstrom Geratebau	Ohmstrasse 1, Neumark, Sachsen, Germany	
International Transformers	Sharston Industrial Estate, Wythenshawe, Manchester, M22 4RU	
Wilson Transformer PTY Ltd	10 Maloney Drive, Wodonga, Victoria 3690. Australia	
STL Stewart Transformers	Unit 1 Townsend IE, Waxlow Road, London, NW10 7NU	Provisional Approval to be confirmed.

8.2 Power Transformer Standard Ratings

The following tables list the manufacturers for power transformer standard ratings currently used by SP Power Systems and their associated part number.

These ratings have been selected to minimise installation and running costs and in the case of transmission transformers to facilitate the holding of spares.

7.2.1 11 / 0.433 kV Unit Type Distribution Transformers

Manufacturer	Type	Power Rating	Remarks	ScottishPower Part Number
Alstom, Turkey		1000kVA		
		500kVA		

7.2.2 11/0.433 kV Cable Connected Distribution Transformers

Manufacturer	Type	Power Rating	Remarks	ScottishPower Part Number
Efacec energie, Portugal		1000kVA	Bushing heights compliant with ENATS 35-1	
		500kVA	Bushing heights compliant with ENATS 35-1	
		500kVA	Manweb tall unit for Y type networks	
		500kVA	Manweb tall type for X type networks with integral CT's	

7.2.3 11/6.6/0.433 kV Unit Type Dual Ratio Distribution Transformers

Manufacturer	Type	Power Rating	Remarks	ScottishPower Part Number
Alstom Turkey		1000kVA		
		500kVA		

7.2.4 11/6.6/0.433 kV Cable Connected Dual Ratio Distribution Transformers

Manufacturer	Type	Power Rating	Remarks	ScottishPower Part Number
Efacec energie, Portugal		1000kVA	Bushing heights compliant with ENATS 35-1	
		500kVA	Bushing heights compliant with ENATS 35-1	
		500kVA	Manweb tall unit for Y type networks	
		500kVA	Manweb tall type for X type networks with integral CT's	

7.2.5 11 kV Primary Pole Mounted Distribution Transformers

Manufacturer	Type	Power Rating	Remarks	ScottishPower Part Number
Pauwells Trafo Ireland Ltd, Cavan.	Single phase	50kVA		
	Three phase	200kVA		
		100kVA		
		50kVA		
	Single phase	50kVA		
		25kVA		

7.2.6 Unused Transformer Insulating Oil

Manufacturer	Type	Power Rating	Remarks	ScottishPower Part Number
Grosvenor Oil Services Ltd	Unused	N/A	Approved to SP specification SUB-03-009	

Note: Reclaimed or Refurbished oil is no longer approved for general use. In exceptional circumstances, “old” oil can be used where technically advantageous when approved by the Engineering and Transmission Operations Manager or his representative.

**APPROVED EQUIPMENT REGISTER
TRANSFORMERS**

7.2.7 Primary Transformers

Manufacturer	Voltage Ratio	Rating (MVA)	Remarks	ScottishPower Part Number
	33/11kV	4		
	33/11kV	7.5		
	33/11kV	7.5/10		
	33/11-6.6kV	7.5 Dual Ratio		
	33/11-6.6kV	7.5/10 Dual Ratio		
	33/11kV	4 Dual Tapping Range		
	33/11kV	7.5 Dual Tapping Range		
	33/11.5kV	12/24 CERS		
	33/11.5Kv	20/40 CERS		

7.2.8 Transmission Transformers

Manufacturer	Voltage Ratio	Rating (MVA)	Tap Changer / Voltage Control	ScottishPower Part Number
	132/33kV	45 MVA	Automatic	
		60 MVA	Automatic	
		90 MVA	Automatic	
	275/33kV	120 MVA	Automatic	
	275/132kV	240 MVA	Standby	
	400/132kV	240 MVA	Standby	
		360 MVA	Standby	
	400/275kV	1000 MVA	None	
	132/25kV	18 MVA 1ph	DETC	
	275/25kV	18 MVA 1ph	DETC	

8.3 Bushings

8.3.1 420 kV

Manufacturer	Type	Current Rating	Remarks	ScottishPower Part Number
Trench (UK) Ltd Hebburn Tyne and Wear	400 HC 450 P	2000A	Transformer/GIS/bushing ERIP insulated non re-entrant SF ₆ /oil bushing with CT accommodation.	
	400 HC 495 L	4000A	Transformer/air bushing OIP insulated condenser type.	
	400 HC 686 F	4000A	Outdoor/indoor wall bushing. OIP condenser type. Does not comply with pollution performance specification of NGTS 2.2	
	400 HC 729 H	4000A	Transformer/GIS bushing. ERIP insulated condenser type.	
	400 HC 904 H	1250A	Transformer/air bushing OIP insulation. For vertical (or up to 30° from the vertical installations only).	
	400 HC 929 A	800A		
	400 HC 930 A	2000A	Transformer/air bushing OIP insulation. For vertical (or up to 30° from the vertical installations only).	
	400 HC 937 B	1250A		
	500 HC 600	4000A	GIS Air Composite housed gas insulated for horizontal use only.	
	400 HC 956	4000A	GIS Air Composite housed gas insulated for horizontal use only (indoor).	
	400 HC 977	4000A	GIS Air bushing gas ERIP insulated for horizontal use only.	

7.3.1 420 kV (cont.)

Manufacturer	Type	Current Rating	Remarks	ScottishPower Part Number
HSP Gmbh Köln (Porz) Germany	SEKGF	4000A	GIS Air bushing gas ERIP composite housed for horizontal use only.	
	EKGF	4000A	GIS Air bushing gas ERIP porcelain housed for horizontal use only.	
ABB Components Ltd Ludvika Sweden	GOE 1300-1150- 2500- 0.6B	2500A	Transformer/air bushing. OIP insulated condenser type. For vertical (or up to 30° from vertical) installations only.	
	GGA	4000A	Vertical installation only	
	GSB 420/1600/0.6-P	1600A	Oil to Air Condenser Bushing ERIP	
ABB Micafil AG, Zurich, Switzerland	RTKF 420-1675/1000 KSI T	1000A	Oil to Air ERIP Composite housed bushing. Mounting position from 0-90 degrees	

8.3.2 300 kV

Manufacturer	Type	Current Rating	Remarks	ScottishPower Part Number
Trench (UK) Ltd Hebburn Tyne and Wear	300 HC 288 G	2500A	GIS/Air bushing. ERIP insulated. Design reservations Category P until external performance established.	
	300 HC 317 L	2000A	Obsolete transformer/air bushing ERIP insulated. FOR SPARES ONLY.	
	300 HC 327 L	1000A	Obsolete transformer/air bushing ERIP insulated. FOR SPARES ONLY.	
	300 HC 342 D	2000A	Outdoor/indoor bushing. OIP insulated. Design reservations Category P until external performance established.	
	300 HC 430 B	3150A	Transformer/air bushing with diameter correction. For vertical (or up to 30° from vertical) installations only.	
	300 HC 431 B	800A	Transformer/air bushing with diameter correction. For vertical (or up to 30° from vertical) installations only.	
	300 HC 435 B	1250A	Transformer/air bushing with diameter correction. For vertical (or up to 30° from vertical) installations only.	
	400 HC 450 P	2000A	Transformer/GIS bushing. ERIP insulated. 400 kV bushing approved for 275 kV use.	

7.3.2 300 kV (cont.)

Manufacturer	Type	Current Rating	Remarks	ScottishPower Part Number
HSP Gmbh Köln (Porz) Germany	SETFt 1175-300-A E=6,0 B	1450A	Silicon Rubber Transformer/air bushing. RIP insulation. For vertical (or up to 30° from vertical) insulation only.	
ABB Components Ltd Ludvika Sweden	GOE 1175-850- 2500-0.60-B (NGC)	2500A	Transformer/air bushing. OIP insulated type. For vertical (or up to 30° from vertical) insulation only.	
	GSB 362/1600/0.6-P	1600A	Oil to Air Condenser Bushing. ERIP insulated type	

8.3.3 145 kV and Below

Manufacturer	Type	Current Rating	Remarks	ScottishPower Part Number
GEC Alsthom-Balteau Stafford	F75 (145kV)	2000A	GIS entry bushing Drawing Ref. F122182 Rev B Pollution and heavy wetting type tests required.	
Trench (UK) Ltd Hebburn Tyne and Wear	120 HC 588 J (145kV)	1600A	Transformer/GIS bushing. ERIP insulated (without CT accommodation). Approved to BEBS T2	
	120 HC 643 F (145kV)	1600A	Transformer/GIS bushing. ERIP insulated Approved to BEBS T2	
	120 HC 731 K (145kV)	1000A	Obsolete transformer/air bushing. OIP insulated FOR SPARES ONLY. Approved to BEBS T2	
	120 HC 881 K (145kV)	3150A	Transformer/air bushing. OIP insulated with CT accommodation.	
	120 HC 887 E (145kV)	2000A	Indoor/indoor wall bushing. ERIP insulated Customer Dwg. no. 120 HC 887E	
	120 HC 907 D (145kV)	2000A	Indoor/indoor wall bushing. ERIP insulated Customer Dwg. no. 120 HC 907D	
	120 HC 1051 D (145kV)	1600A	Outdoor/Indoor bushing. OIP insulated. Design reservations Category P until external Performance established.	
	120 HC 1178	1200A	General replacement for 120 HC 312	
	60 HC 773 B (66kV)	1600A	Transformer/air bushing. OIP insulated	
	60 HC 774 C (66kV)	400A	Transformer/air bushing. OIP insulated	
60 HC 914 E (66kV)	400A	OIP insulated. For vertical use only Drawing No 60HC914 E		

7.3.3 145 kV and Below (cont.)

Manufacturer	Type	Current Rating	Remarks	ScottishPower Part Number
ABB Components Ltd Ludvika Sweden	GOE-650-500-3150-0.6-B (145kV)	3150A	Transformer/air bushing. OIP insulated	
	GOB-650-1250-LF123-175K	1250A	Transformer/air bushing. OIP insulated	
	GOB 380 (84kV)	400A	Transformer/air bushing. OIP insulated	
	GOB 380 (84kV)	3150A	Transformer/air bushing. OIP insulated	
	GOB-250-800-LF-173-K	800A	Transformer/air bushing. OIP insulated	
	GSA 145-0A/1600/0.5	1600A	Oil to Air condenser bushing. ERIP Insulated	
	GSA 145-0A/1600/0.3	1600A	Oil to Air condenser bushing. ERIP Insulated	
	GSA 73-0A/2000/0.5	2000A	Oil to Air condenser bushing. ERIP Insulated	
	GSA 73-0A/2000/0.3	2000A	Oil to Air condenser bushing. ERIP Insulated	
MGC Moser Glaser, Kaiseraugst, Switzerland	DTOI 145-800	800A	Oil to Air condenser bushing. ERIP Insulated	
Trench (UK) Ltd Hebburn Tyne and Wear	30 HC 191 B (33kV)	14,000A	SRBP transformer/air bushing Approved to BEBS T2	
	30 HC 230 F (33kV)	10,000A	Transformer/air bushing. ERIP insulated oil flooded. Approved to BEBS T2	
	10 HC 163 G (17.5kV)	10,000A	Transformer/air bushing. ERIP insulated	
Webster Wilkinson	20F/4500 (24kV)	4500A	Flooded Type, Drawing No 20F/4500 Issue A	

8.4 Tap Changers

8.4.1 On Load Tap Changers

Manufacturer	Type	Application	Remarks	ScottishPower Part Number
Associated Tap Changers Ltd	Type AT	Up to 40 MVA at 33kV	Bolt On	
ABB Components	Type UZE	Up to 60 MVA neutral end	Bolt On	
	Type UZF	Up to 60 MVA neutral end	Bolt On	
Maschinfabrik Reinhausen	Type M	Up to 240 MVA neutral or line end	In Tank	
	Type VV	Up to 40 MVA at 36kV	In Tank	
	Type V	Up to 40 MVA at 36kV	In Tank	

8.4.2 De-energised Tap Changers

Manufacturer	Type	Application	Remarks	ScottishPower Part Number
Webster & Wilkinson	Off circuit Tap selector	Distribution TX's up to 1000kVA	Rotary DETC to ESI 35-1	
ASP (France)	Heavy Duty DETC	Railtrack 1ph 25kV Transformers up to 26 MVA		
ASP (France)	Linear DETC	Distribution TX's up to 1000kVA	Linear	