

## **Appendix 1 to the Board's determination under Section 175(5) of the Pensions Act 2004 in respect of the financial year 1 April 2008 – 31 March 2009**

### **Formulae for transforming section 179 valuation results to a section 179 basis as at 31 October 2007 for the purpose of calculating the pension protection levy in respect of the financial year 1 April 2008 – 31 March 2009**

#### **Summary**

This document details the formulae developed jointly by the Board of the Pension Protection Fund and the Government Actuary's Department to transform valuation results which have been provided to the Board on a section 179 basis (from scheme return data or otherwise) as at a date other than 31 October 2007 into valuation results on a section 179 basis as at 31 October 2007 (referred to as "the output date" below).

#### **1 Background**

- 1.1 Each scheme that became registrable prior to 6 April 2007 is required to submit its first section 179 valuation to the Pension Protection Fund by 31 March 2008. Some schemes will have submitted more than one section 179 valuation by that date. This information will be used, as described in this Appendix 1, to assess the scheme's funding position on the section 179 basis as at 31 October 2007. If a scheme to which the statutory 31 March 2008 deadline applies fails to submit a section 179 valuation by this deadline then the funding position as at 31 October 2007 will be calculated as described in Appendix 2.
- 1.2 The section 179 valuation result provided may have been prepared in accordance with a different version of the valuation guidance to that in force at 31 October 2007 (depending on the date on which it was certified) and this is taken into account in the transformation formulae. The Board has decided, however, that no allowance will be made in the roll forward methodology to account for the change in Normal Pension Age that was introduced in April 2007 in guidance version G4.
- 1.3 A model created in conjunction with the Government Actuary's Department enables the Board to transform section 179 valuations to a consistent valuation date, 31 October 2007.
- 1.4 The model itself only uses information about each scheme that will be supplied by the scheme to the Board either directly (the section 179 valuation result) or from the scheme return data submitted by the scheme to the Pensions Regulator, together with published data on investment market conditions.

## 2 Summary of the calculation

- 2.1 The formulae constitute a technical actuarial document which is intended to be read only by those with significant experience in carrying out actuarial calculations. For those with a broad interest in the conversion methodology, the main stages of the calculations are summarized below.
- 2.2 Transformation of the value of the protected liabilities on the section 179 basis as at the input date to the value of protected liabilities on the section 179 basis as at the output date (31 October 2007).
- The section 179 methodology prescribes an allowance for expenses. Where the liabilities excluding expenses are not explicitly identifiable (e.g. where, exceptionally, the Board has to use data taken from an old version of the scheme return) then removing this allowance is the first stage in transforming the liabilities.
  - The formulae then use figures for the proportions of liabilities that relate to service before and after 6 April 1997 taken, where possible, from the scheme return data, to allow for differences in Pension Protection Fund compensation for service before and after 1997. Where these figures have not been given, assumptions are made.
  - Ratios of annuity factors and deferred annuity factors are then used to convert the adjusted section 179 liabilities to liabilities on section 179 assumptions as at the output date (31 October 2007).
- 2.3 Moving assets and the liabilities forward (or backward) from the date of the section 179 calculation to the output date.
- Liabilities are increased (or discounted) at a rate that is reasonably consistent with section 179 assumptions, as the liabilities are now closer to (or further away from) coming into payment. The liabilities are now at the output date.
  - The assets are assumed to achieve (or to have achieved) returns in line with certain stock market indices, allowance being made for how much of the scheme's assets are invested in equities, bonds etc. as taken from the scheme return data provided to the Pensions Regulator.
  - Neither assets nor liabilities are adjusted for benefit payments. Liabilities are not adjusted for new benefit accrual, nor are assets adjusted for contributions. The comparatively short period between the section 179 valuation effective date and the output date (31 October 2007) should mean that any inaccuracies arising from this are small. Separate certification of deficit-reduction contributions should be considered where these may materially affect the result.
- 2.4 As a final step the expenses specified for Section 179 calculations are added to the liabilities to give the final results.

### 3 Summary of outputs from and inputs to the formulae

#### 3.1 Outputs

• Assets for section 179 valuation	S179Ass
• Liabilities for pensions in payment (excluding section 179 member-related expenses)	S179PL
• Liabilities for deferred members (excluding section 179 member-related expenses)	S179DL
• Liabilities for active members (excluding section 179 member-related expenses)	S179AL
• External liabilities	S179ExLiab
• s.179 estimated cost of wind-up (excluding benefit installation/payment)	S179WUExp
• s.179 estimated expenses of benefit installation/payment	S179PayExp
• Effective date of the section 179 valuation required for output (31 October 2007)	OutputDate
• Total liabilities (including section 179 expense allowance)	S179TL

#### 3.2 Inputs

The section 179 valuation results as given on the scheme return data submitted to the Pensions Regulator or, where relevant, on the Section 179 valuation certificate submitted to the Pension Protection Fund:

• Assets for section 179 valuation purposes	S179InputAss
• Date of relevant accounts giving asset figure	RelAcDate
• Total value of protected liabilities	S179InputTL
• Liabilities for pensions in payment, possibly including expenses	S179InputPL
• Liabilities for deferred members, possibly including expenses	S179InputDL
• Liabilities for active members, possibly including expenses	S179InputAL
• Estimated costs of windup (excluding benefit installation/payment)	S179InputWUExp
• Estimated expenses of benefit installation/payment	S179InputPayExp
• Proportion of pensioner liabilities, excluding expenses, relating to service before 6 April 1997	S179InputPPre97 Ppn

• Proportion of deferred pensioner liabilities, excluding expenses, relating to service before 6 April 1997	S179InputDPre97 Ppn
• Proportion of active member liabilities, excluding expenses, relating to service before 6 April 1997	S179InputAPre97 Ppn
• External liabilities	S179InputExLiab
• Effective date of the section 179 valuation	S179InputDate
• Version number of s.179 guidance used for this valuation	S179InputGuiVNo
• Version number of s.179 assumptions used for this valuation	S179InputAssVNo

Scheme asset information in the scheme return data– percentages of the total assets as at the date of the last audited financial statement (referred to as “AssetDate” below). Note that this may be different from both the S179InputDate and the RelAcDate identified above; the value of assets at AssetDate is not known, and it may be rather different from S179InputAss where, for instance, a bulk transfer has taken place:

• Gilts/fixed interest products	FI%
• Equities	Eq%
• Property	Pr%
• Insurance policies (excluding managed funds)	IP%
• Cash and deposits	Ca%
• Commodities	Co%
• Other	Ot%
• Date of asset breakdown	AssetDate

Numbers of members with defined benefits only or partial defined benefits from the scheme return data

• Pensioner members	PMemNo
• Deferred members	DMemNo
• Active members	AMemNo

Average ages of different classes of members from the scheme return data

• Pensioner members	PAvAge
• Deferred members	DAvAge

Where any of the above information has not been provided, the Board will need to assume a value. Details of the assumptions that will be made in these circumstances are set out in section 5 of this document. Note also that average ages falling outside particular ranges will be subject to adjustment (see section 5 of this document for details).

## 4 The formulae

### 4.1 Transformation of liabilities on the section 179 basis on assumptions as at the input date to the section 179 basis as at the output date

#### 4.1.1 Strip out any expense allowance from liability figures for each class of membership if necessary

If  $S179InputWUExp + S179InputPayExp > 0$

or  $S179InputGuiVNo=V1$  and  
 $S179InputTL > S179InputPL + S179InputDL + S179InputAL$

then the input liabilities should not contain expenses so

$$S179InputPLNoExp = S179InputPL$$

$$S179InputDLNoExp = S179InputDL$$

$$S179InputALNoExp = S179InputAL$$

Otherwise

$$S179InputPLNoPayExp = S179InputPL - £350 \times PMemNo$$

$$S179InputDLNoPayExp = S179InputDL - £500 \times DMemNo$$

$$S179InputALNoPayExp = S179InputAL - £500 \times AMemNo$$

$$\text{And } S179InputTLNoPayExp = S179InputPLNoPayExp + \\ S179InputDLNoPayExp + S179InputALNoPayExp$$

$$S179InputPLNoExp = S179InputPLNoPayExp / (1 + S179InputExp\%)$$

$$S179InputDLNoExp = S179InputDLNoPayExp / (1 + S179InputExp\%)$$

$$S179InputALNoExp = S179InputALNoPayExp / (1 + S179InputExp\%)$$

Where

If  $S179InputTLNoPayExp < £51.5$  million, then

$$(1 + S179InputExp\%) = 103\%$$

If £51.5 million =< S179InputTLNoPayExp < £102.5 million, then

$$(1 + S179InputExp\%) = (1.02 \times S179InputTLNoPayExp) / (S179InputTLNoPayExp - \text{£}0.5 \text{ million})$$

If S179InputTLNoPayExp >= £102.5 million, then

$$(1 + S179InputExp\%) = (1.01 \times S179InputTLNoPayExp) / (S179InputTLNoPayExp - \text{£}1.5 \text{ million})$$

#### **4.1.2 Divide the liabilities between those accrued before and after April 1997 (different indexation)**

$$S179InputPLPre97 = S179InputPLNoExp \times S179InputPPre97Ppn$$

$$S179InputPLPost97 = S179InputPLNoExp \times (1 - S179InputPPre97Ppn)$$

$$S179InputDLPre97 = S179InputDLNoExp \times S179InputDPre97Ppn$$

$$S179InputDLPost97 = S179InputDLNoExp \times (1 - S179InputDPre97Ppn)$$

$$S179InputALPre97 = S179InputALNoExp \times S179InputAPre97Ppn$$

$$S179InputALPost97 = S179InputALNoExp \times (1 - S179InputAPre97Ppn)$$

Details of the assumptions made where S179InputPPre97Ppn, S179InputDPre97Ppn or S179InputAPre97Ppn have not been provided are set out in section 5 of this document.

#### **4.1.3 Convert from section 179 economic assumptions as at S179InputDate to section 179 economic assumptions as at OutputDate**

The economic assumptions as at OutputDate (31 October 2007) should be based on s.179 assumptions version 3.

#### **Annuities used for conversion**

##### *General assumptions for annuity factors*

- Mortality: PA92 with medium cohort improvements from 1992. The 'year of use' to adopt is described in the following table for annuities at S179InputDate (substitute OutputDate for S179InputDate to obtain year of use applicable to annuities at OutputDate)

<b>Annuity</b>	<b>Year of Use</b>
annuityfactorpre97	S179InputDate
annuityfactorpost97	S179InputDate
defannuityfactorpre97def	S179InputDate + 63 – DAvAge
defannuityfactorpost97def	S179InputDate + 63 – DAvAge
defannuityfactorpre97act	S179InputDate + 63 – AAvAge
defannuityfactorpost97act	S179InputDate + 63 – AAvAge

- Age: PAvAge/DAvAge/AAvAge (as appropriate)<sup>1</sup> - where DAvAge or AAvAge > 63, an immediate annuity is used in place of a deferred annuity
- Sex: male
- Spouse's proportion: 50%
- Proportion married: 80%
- Wife three years younger than member
- No allowance for pre-retirement mortality
- Normal pension age: 63
- No guarantee period for annuities

#### *Discount rate – pre retirement*

The annuity factors applicable to non-pensioners are those prefixed by 'def'. The pre-retirement discount rate is derived as follows:

Where S179InputGuiVNo = V1 or V2:

- Average of FTSE Actuaries Government Securities Index-Linked annualised real yields over 15 years assuming 0% and 5% inflation as at InputDate, less 0.5%

Where S179InputGuiVNo = G3 or G4 and S179InputAssVNo = A3:

- Average of FTSE Actuaries Government Securities Index-Linked annualised real yields over 15 years assuming 0% and 5% inflation as at InputDate, less 0.7%

Since there is no allowance for mortality before retirement, generally  $\text{defannuityfactor}(t) = (1 / (1 + i)^t) \times \text{annuityfactor}(t)$ , where t is the period to retirement (taken as normal pension age less DAvAge/AAvAge as appropriate).

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<sup>1</sup> Details of the assumptions made where average ages have not been provided by schemes are set out in section 5 of this document.

### *Discount rate – post retirement*

The post-retirement discount rate should be derived as follows:

- annuityfactorpre97, defannuityfactorpre97def and defannuityfactorpre97act – equal to the annualised yield on FTSE Actuaries Government 10 year Fixed Interest Index.
- annuityfactorpost97, defannuityfactorpost97def and defannuityfactorpost97act:
  - where S179InputGuiVNo = V1 or V2, the average of Government Securities Index-linked annualised real yields over 5 years assuming 0% and 5% inflation, less 0.5%.
  - Where S179InputGuiVNo = G3 or G4 and S179InputAssVNo = A3, the maximum of A and B, where A is the average of the Government Securities Index-linked annualised real yields over 5 years assuming 0% and 5% inflation, less 0.5%. B is the annualised yield on the FTSE Actuaries Government 10 year Fixed Interest Index, less 2.5%.

### **Pensioner liabilities**

S179PLPre97@S179InputDate

$$= S179InputPLPre97 \times \frac{\text{annuityfactorpre97}(S179rate@OutputDate)}{\text{annuityfactorpre97}(S179rate@S179InputDate)}$$

S179PLPost97@S179InputDate

$$= S179InputPLPost97 \times \frac{\text{annuityfactorpost97}(S179rate@OutputDate)}{\text{annuityfactorpost97}(S179rate@S179InputDate)}$$

### **Non-pensioner liabilities**

S179DLPre97@S179InputDate

$$= S179InputDLPre97 \times \frac{\text{defannuityfactorpre97def}(S179rate@OutputDate)}{\text{defannuityfactorpre97def}(S179rate@S179InputDate)}$$

S179ALPre97@S179Inputdate

$$= S179InputALPre97 \times \frac{\text{defannuityfactorpre97act}(S179rate@OutputDate)}{\text{defannuityfactorpre97act}(S179rate@S179InputDate)}$$

$$\begin{aligned}
& S179DLPost97@S179InputDate \\
& = S179InputDLPost97 \times \frac{\text{defannuityfactorpost97def}(S179rate@OutputDate)}{\text{defannuityfactorpost97def}(S179rate@S179InputDate)}
\end{aligned}$$

$$\begin{aligned}
& S179ALPost97@S179InputDate \\
& = S179InputALPost97 \times \frac{\text{defannuityfactorpost97act}(S179rate@OutputDate)}{\text{defannuityfactorpost97act}(S179rate@S179InputDate)}
\end{aligned}$$

## 4.2 Transforming the liabilities and external liabilities from S179InputDate to OutputDate and transforming the assets from RelAcDate to OutputDate

### 4.2.1 Liabilities

$$\begin{aligned}
& S179PLPre97@OutputDate \\
& = S179PLPre97@S179InputDate \times (1 + i)^{(OutputDate - S179InputDate)}
\end{aligned}$$

$$\begin{aligned}
& S179DLPre97@OutputDate \\
& = S179DLPre97@S179InputDate \times (1 + i)^{(OutputDate - S179InputDate)}
\end{aligned}$$

$$\begin{aligned}
& S179ALPre97@OutputDate \\
& = S179ALPre97@S179InputDate \times (1 + i)^{(OutputDate - S179InputDate)}
\end{aligned}$$

$$\begin{aligned}
& S179PLPost97@OutputDate \\
& = S179PLPost97@S179InputDate \times (1 + i)^{(OutputDate - S179InputDate)}
\end{aligned}$$

$$\begin{aligned}
& S179DLPost97@OutputDate \\
& = S179DLPost97@S179InputDate \times (1 + i)^{(OutputDate - S179InputDate)}
\end{aligned}$$

$$\begin{aligned}
& S179ALPost97@OutputDate \\
& = S179ALPost97@S179InputDate \times (1 + i)^{(OutputDate - S179InputDate)}
\end{aligned}$$

The time period OutputDate – S179InputDate is measured in years and fractions of years.

i = annualised yield on the FTSE Actuaries Government 15-Year Fixed Interest index as at OutputDate.

$$S179PL = S179PLPre97@OutputDate + S179PLPost97@OutputDate$$

$$S179DL = S179DLPre97@OutputDate + S179DLPost97@OutputDate$$

$$S179AL = S179ALPre97@OutputDate + S179ALPost97@OutputDate$$

#### 4.2.2 External liabilities

Depending on the source of the s.179 valuation data and the version of the guidance under which the valuation was prepared, external liabilities (S179InputExLiab) may be either included in the total liabilities (S179InputTL) or deducted from the assets (S179InputAss).

If  $S179InputTL = S179InputPL + S179InputDL + S179InputAL + S179InputWUExp + S179InputPayExp + S179InputExLiab$

Then

$$S179ExLiab = S179InputExLiab$$

$$AdjS179InputAss = S179InputAss$$

Otherwise

$$S179ExLiab = S179InputExLiab$$

$$AdjS179InputAss = S179InputAss + S179InputExLiab$$

#### 4.2.3 Assets

Where  $FI\% + Eq\% + Pr\% + IP\% + Ca\% + Co\% + Ot\% \neq 100\%$  the values will be adjusted using the approach set out in section 5 of this document.

Reflect returns likely to be earned or to have been earned on schemes' actual assets using, as far as possible, published information about returns on assets in different classes.

If  $AssetDate = RelAcDate$ ,

$$FI@RelAcDate = AdjS179InputAss \times FI\%$$

$$Equities@RelAcDate = AdjS179InputAss \times Eq\%$$

$$Prop@RelAcDate = AdjS179InputAss \times Pr\%$$

$$Insurance@RelAcDate = AdjS179InputAss \times IP\%$$

$$Cash@RelAcDate = AdjS179InputAss \times Ca\%$$

$$Commodities@RelAcDate = AdjS179InputAss \times Co\%$$

$$Other@RelAcDate = AdjS179InputAss \times Ot\%$$

Then,

$FI@OutputDate = FI@RelAcDate$

$\times \frac{FTSE\ Actuaries\ Government\ Securities\ UK\ Gilts\ All\ Stocks\ TRI@OutputDate}{FTSE\ Actuaries\ Government\ Securities\ UK\ Gilts\ All\ Stocks\ TRI@RelAcDate}$

$Equities@OutputDate$

$= Equities@RelAcDate \times EqRet(RelAcDate, OutputDate)$

Where

$EqRet(RelAcDate, OutputDate) = 55\% \times \frac{FTSE-Allshare\ TRI@OutputDate}{FTSE-Allshare\ TRI@RelAcDate}$   
 $+ 45\% \times \frac{FTSE\ All-World\ Ex\ UK\ TRI@OutputDate^2}{FTSE\ All-World\ Ex\ UK\ TRI@RelAcDate}$

$Prop@OutputDate$

$= Prop@RelAcDate \times PropRet(RelAcDate, OutputDate)$

Where

$PropRet(RelAcDate, OutputDate) = \frac{FTSE-Allshare\ TRI@SwitchDate}{FTSE-Allshare\ TRI@RelAcDate} \times$

$\frac{FTSE\ UK\ All\ property\ Gross\ TRI@OutputDate}{FTSE\ UK\ All\ property\ Gross\ TRI@SwitchDate}$

where SwitchDate = max(RelAcDate, 22 June 2006)

$Cash@OutputDate$

$= Cash@RelAcDate \times (1 + Cashreturn\%(RelAcDate, OutputDate))$

Cashreturn% estimated by rolling up Bank of England base rate from RelAcDate to OutputDate

$Insurance@OutputDate$

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<sup>2</sup> FTSE All World Ex UK TRI (Sterling denominated) to be used

$$= \text{Insurance@RelAcDate} \times \text{CompRet}(\text{RelAcDate}, \text{Outputdate})$$

Where

CompRet(RelAcDate, Outputdate) = Composite roll-up factor created based on 50% of the fixed interest roll-up factor above, 25% of the equity roll-up factor and 25% of the cash roll-up factor

$$\text{Commodities@OutputDate} = \text{Commodities@RelAcDate} \\ \times \text{CompRet}(\text{RelAcDate}, \text{Outputdate})$$

$$\text{Other@OutputDate} = \text{Other@RelAcDate} \\ \times \text{CompRet}(\text{RelAcDate}, \text{Outputdate})$$

S179Ass

$$= \text{FI@OutputDate} + \text{Equities@OutputDate} \\ + \text{Prop@OutputDate} + \text{Insurance@OutputDate} \\ + \text{Cash@OutputDate} + \text{Commodities@OutputDate} + \text{Other@OutputDate}$$

If AssetDate is earlier than RelAcDate

Derive the asset distribution at RelAcDate based on the given asset distribution at AssetDate, allowing for differential asset returns based on information on returns on different investments in the period AssetDate to RelAcDate. This is done using the formulae above. The asset distribution at RelAcDate is thereby calculated by normalising the total to 100%.

If AssetDate is later than RelAcDate,

Derive the asset distribution at RelAcDate based on the given asset distribution at AssetDate, allowing for differential asset returns based on information on returns on different investments in the period RelAcDate to AssetDate. In effect the roll-forward formulae above are used “in reverse” for the period from AssetDate back to RelAcDate and applied to the proportions of assets in each class as at AssetDate. The assets distribution at RelAcDate is thereby calculated by normalising the total to 100%.

### 4.3 Application of section 179 expenses

If S179InputPayExp >0 then

$$\text{S179PayExp} = \text{S179InputPayExp}$$

Otherwise

$$\text{S179PayExp} = \text{£}350 \times \text{PMemNo} + \text{£}500 \times (\text{DMemNo} + \text{AMemNo})$$

In all cases

If  $S179PL + S179DL + S179AL < \text{£}50$  million, then

$$S179WUExp = (S179PL + S179DL + S179AL) \times 0.03$$

If  $\text{£}50\text{million} \leq S179PL + S179DL + S179AL < \text{£}100$  million, then

$$S179WUExp = (S179PL + S179DL + S179AL) \times 0.02 \\ + \text{£}0.5 \text{ million}$$

If  $S179PL + S179DL + S179AL \geq \text{£}100$  million, then

$$S179WUExp = (S179PL + S179DL + S179AL) \times 0.01 \\ + \text{£}1.5 \text{ million}$$

$$S179Exp = S179PayExp + S179WUExp$$

#### 4.4 Total liabilities on section 179 basis

$$S179TL = S179PL + S179DL + S179AL + S179Exp \\ + S179ExLiab$$

### 5. Assumptions made where input information has not been provided in full

If total value of protected liabilities ( $S179InputTL$ ) is provided, but  $S179InputPL$ ,  $S179InputDL$  and  $S179InputAL$  are missing:

• Liabilities for pensions in payment, possibly including expenses	$S179InputPL$	$= 0.44 \times S179InputTL$
• Liabilities for deferred members, possibly including expenses	$S179InputDL$	$= 0.24 \times S179InputTL$
• Liabilities for active members, possibly including expenses	$S179InputAL$	$= 0.29 \times S179InputTL$

If the proportions of liabilities relating to service before 6 April 1997 are not provided the following will be assumed:

• Proportion of pensioner liabilities, excluding expenses, relating to service before 6 April	$S179InputPPre97Ppn$	$= 0.9$
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1997		
• Proportion of deferred pensioner liabilities, excluding expenses, relating to service before 6 April 1997	S179InputDPre97Ppn	= 0.8
• Proportion of active member liabilities, excluding expenses, relating to service before 6 April 1997	S179InputAPre97Ppn	= 0.6

Where the total of the percentages of the assets in each asset class (FI% + Eq% + Pr% + IP% + Ca% + Co% + Ot%) is less than 100% (or no breakdown is provided), Ca% will be increased to give a total of 100%. Where the total of the percentages of the assets in each class is greater than 100%, the percentages will be pro-rated so as to give an adjusted total equal to 100%.

If PMemNo + DMemNo + AMemNo = 0 but total membership number, TotMemNo, is provided then

• Pensioner members	PMemNo	= 0.45 x TotMemNo
• Deferred members	DMemNo	= 0.25 x TotMemNo
• Active members	AMemNo	= 0.30 x TotMemNo

Where average ages of different classes of members are not provided the following will be assumed

• Pensioner members	PAvAge	66
• Deferred members	DAvAge	46
• Active members	AAvAge	46

Note also that where average ages have been provided, if they fall outside of particular ranges, they will be subject to the following adjustments

• Pensioner members	PAvAge	PAvAge>120 reduced to 66, PAvAge<25 increased to 25
• Deferred members	DAvAge	DAvAge>75 reduced to 46, DAvAge < 25 increased to 25
• Active members	AAvAge	AAvAge>75 reduced to 46, AAvAge <25 increased to 25

Where the number of the valuation guidance has not been provided, guidance number V2 will be assumed.